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Comparative performance between Greek and UK manufacturing industries, 1963-84

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COMPARATIVE PERFORMANCE BETWEEN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84.

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A. Paris

This thesis is dedicated
to my parents
Gregoris and Mary Paris.

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Contents

Abstract

The objective of this thesis is to examine and compare the performance of Greek and UK manufacturing industries at an aggregate and disaggregare level during the period 1963-84.

The comparative analysis between the two manufacturing sectors is based on the concepts of development theory that intercountry comparisons are very important in understanding the economic and industrial conduct and recognising similar features of development.

The main focus of this dissertation is to explore the possibility that there has been a convergence between the Greek and UK manufacturing industries over the period 1963-84. To facilitate this four hypotheses are tested which are that there has been a convergence between the Greek and UK manufacturing industries in respect of (i) output, (ii) capital and labour inputs, capital intensity, capital and labour productivity and labour costs, (iii) total factor productivity and (iv) trade performance.

The results found supported the convergence hypothesis.

CHAPTER ONE

INTRODUCTION

PURPOSE AND OUTLINE OF THIS STUDY

Statistical analyses of the structure, conduct and performance of either Greek or UK industries are many, but there are few, if any, detailed statistical studies comparing the performance of the manufacturing sectors in the two countries. In cases where comparisons between Greek and UK industries are undertaken, the main purpose of these studies is not the thorough comparison of the two industries and therefore only a few points are mentioned and compared between the two manufacturing sectors. This is probably the first detailed comparative study of Greek and UK manufacturing industries, at an aggregate and disaggregate level.

This thesis examines and compares the performance of Greek and UK manufacturing sectors at an aggregate and disaggregate level over the period 1963-84. It studies whether there was a convergence between the patterns of growth in Greek and UK manufacturing industries in terms of output, capital and labour input, capital intensity, capital and labour productivity, total factor productivity, and, trade performance. The purpose of this thesis is not only to consider whether Greek industry was moving closer to the UK but to examine the influences on the growth of the two manufacturing sectors in terms of the above factors.

The aim of this introductory chapter is to address the objective of this thesis, explain the convergence hypothesis between Greek and UK manufacturing industries, discuss the data used and outline this study.

- *The development process and the convergence hypothesis*

a) the development process

This sub-section will attempt to explain the reasons for examining and comparing Greek and UK manufacturing industries based on the development process theory. At first, the concept of development theory will be considered.

Intercountry comparisons are important in understanding the function of economic and social development. Furthermore, to evaluate as well as to generalize from the historical experience of one country, it is beneficial to compare it in some way to that of other countries. Such comparisons help identify homogeneous features of development and different hypotheses as to their causes can be examined. According to Chenery and Syrquin[1], comparative study is as important as the structure and assessment of development policy.

In general terms, a development pattern may be expressed as an orderly variation in any significant area of the economic or social structure related with a rising level of income or the index of development[1]. Arthur Lewis[2] considered the concept of development as a transition from traditional to modern forms of production and economic behaviour. Chenery[3] explained that the transition from a traditional to a developed economy can be generally expressed as the set of changes in the economic structure required to hold a continued growth in income and social welfare.

Lewis considered that during the period of the transition, the supply of unskilled labour is elastic; profits, investment and savings are growing; industry increases faster than agriculture; and the form of international trade gradually changes as the comparative advantage of a country alters. Kuznets[4] and Lewis valued the transition by the accumulation of physical and human capital and by the change of the structure of demand, production, trade, and employment as the level of income grows. These phenomena were examined in the historical experience of the advanced countries as well as from intercountry comparisons.

Engel's law[5] gives another example of a universal development conduct. It implies that the share of food in total consumption will drop as the level of income increases. When connected with other development traits, such as the accumulation of capital as well as skills with rising income, Engel's law helps to account for the observed patterns of industrialization.

The study of Chenery and Syrquin[1] selects ten basic processes that appear to be essential features of development in all countries. These processes are: investment, government revenue, education, structure of domestic demand, structure of production, structure of trade, labour allocation, urbanization, demographic transition and income distributions. Chenery and Syrquin add that it is nearly impossible to create a disaggregated model of long-term growth in which there is not some switch of resources from primary production to industry, an increase in the ratio of capital to labour, and a systematic change in the composition of imports and exports. In aggregate terms, Chenery and Syrquin demonstrated that the rise of industry is remarkably uniform across countries despite the variability of trade patterns due to greater weight of domestic demand as compared with trade.

Syrquin[6] explained that the principal transnational factors are the industrial system (being the system of production which is based on the application of the technological potential afforded by modern science), a community of human wants and aspirations, and organization of the world into nation-states. He stressed that the existence of transnational or universal factors is the basis for anticipating uniformities in the growth process. Undoubtedly, national or particular factors that are recognized from the outset make obvious the inevitability of differences at some level. Hence, some comparative approach indicates uniformities at a macro level of analysis, but permits for variations at a micro level.

Chenery and Syrquin[7] studied 108 economies across the period 1950-83 on areas of economic structure associated with the sectoral allocation of resources such as demand, trade, production and factor use. Their results reinforced the strong relation of economic structure with the level of development, where income is the measure of development. They considered that the changes in structure during the development process are better expressed by the notion of a transition from a low income agrarian economy, to an industrial urban economy with substantially higher income.

The comparative analysis between Greek and UK manufacturing industries is based on the concepts of development theory that intercountry comparisons are valuable; firstly, understanding the economic and industrial conduct and, secondly, recognising homogeneous features of development. But in respect of industrial development where does Greece stand in comparison to the UK? The following section is a preliminary analysis that attempts to answer this question. This analysis employs evidence from existing studies and from pilot tests.

b) existing studies

Some comparative studies between Greece and the UK do exist and even though they focus on issues outside the scope of this project some do address particularly relevant issues in respect of this research.

Nadiri[8,9] first discussed different methodological issues concerning the derivation and estimation of partial and total factor productivity indices. His work summarized the outcomes of several studies on total factor productivity of 25 countries including Greece and the UK across the period 1950-65.

He also studied the contribution of labour and capital inputs, total factor productivity and rates of growth of income for a series of countries including the UK for the period 1950-62 and

Greece for the period 1951-61. Over this period of time the rate of growth of income was more than twice as fast in Greece than in the UK. The main contributors to growth of income were labour input in Greece and total factor productivity in the UK.

Nadiri also demonstrated the contribution of various components of labour and capital inputs to the growth of income. The labour input was sub-divided into employment, health and nutrition, working hours, age-sex composition and the educational attainment of the labour force. It was shown that the contribution of education to the growth of income in Greece and the UK was large as was the increase of hours of work in Greece. Furthermore, capital input was sub-divided into capital in dwellings; non-residential structural, land, equipment, inventories; and international assets. The contribution of capital in all except international assets to the growth of income was shown to be very high in both Greece and the UK.

Kintis[10] examined the Greek economy and particularly its manufacturing industry during 1950-80 mainly in terms of output, capital stock, capital and labour productivity, total factor productivity, and size of industries. Furthermore, he considered the likely consequences of EEC (European Economic Community) membership on Greek industry.

He demonstrated that Greek economy grew rapidly across the period 1950-80 largely due to great accumulation of capital stock and improvement of productivity.

Kintis also compared some aspects of the Greek economy and industry to those of other EEC countries including the UK. He exhibited that during 1970-74 the share of gross fixed capital stock in manufacturing industry represented 15.1% of total capital stock while in the UK was 18.8%. Furthermore, over the same period of time, the participation of gross fixed capital stock in gross national product was 20.9% in Greece and 21.3% in the UK. In the period 1959-69 the average capital productivity in Greece was slightly higher to the average capital productivity of OECD and the UK.

Chassid[11] studied the Greek economy over the period 1960-75 and also examined the Greek manufacturing industry and the likely consequences of EEC membership on Greek industry. In addition, he compared different aspects of the Greek economy and industry to those of other EEC countries including the UK during 1960-75. He demonstrated that across the 1960-75 period the average annual rate of growth of gross domestic product (GDP) and labour productivity was higher in Greece than in the UK. Over the same period of time, capital stock increased twice as fast in Greece in comparison to the UK. During 1960-65, the share of exports in the GDP was more than twice greater in the UK than in Greece; during 1966-70 this share was twice as great in the UK than in Greece and in the period 1971-75 less than double.

Chassid also compared the distribution of different Greek and UK manufacturing industries in terms of number of establishments, labour, gross output and value added over the years 1963, 1968 and 1973. He concluded that although in 1963 the structure of the two industries was different, in 1968 and 1973 there was a greater similarity between the two manufacturing sectors due to development of the Greek industry to a level more comparable to that of the UK. This resulted from the improvement of capital goods industries (that is heavy industries) besides consumer goods industries (light industries). In addition Chassid demonstrated that although labour productivity of Greek industry represented only 36% of the UK, in 1973 this figure increased to 59%.

Thus, Nadiri[8,9] has demonstrated that the rate of growth of income was over twice as fast in Greece than in the UK in an earlier period than this thesis examines, namely 1950-62. Kintis[10] showed that the average capital productivity in Greece was higher than in the UK during 1959-69. Chassid[11] showed that the average annual rate of growth of gross domestic product (GDP), capital stock (CS) and labour productivity (LP) was higher in Greece than in the UK over the period 1960-75. The above studies indicate that Greece was getting closer to the UK in terms of economic development during 1950-75.

Furthermore, Chassid demonstrated that although in 1963 the structure of Greek and UK manufacturing industries were different in terms of number of establishments, labour, gross output and value added; over the years 1968 and 1973 there was a greater similarity between the two manufacturing sectors in terms of these factors. He argued that Greek manufacturing industry was developing to a level more comparable to that of the UK, largely due to the improvement of capital goods industries. Hence, Greek manufacturing industry was catching up with the UK over the period 1963-73.

Could it possibly be considered that Greece continued getting closer to the UK in terms of industrial development for a period after 1973? In order to answer this question preliminary tests were carried out examining whether Greek manufacturing industry was catching up with the UK in respect of shares of manufacturing output in GDP, output, and output per head over the period 1963-84.

c) pilot studies

The absolute differences between the proportions of manufacturing in GDP in Greece and the UK were studied over the period 1963-84. The equation found is as follows:

Regression analysis of the absolute differences between the Greek and UK shares of manufacturing in GDP against time, 1963-84.

$$Y = 5.26 - 0.72\,T \qquad R^2 = 0.68 \qquad (1.1)$$
$$(-6.58) \qquad d = 1.99$$

where Y represents the absolute differences between the shares of manufacturing output in GDP in Greece and the UK; T is time, period 1963-84; t-statistics can be seen in brackets and $t = 2.086$ at a 5 % level of significance, a two-tail test. Source: as table 3.1.

It is obvious from the coefficient in time "b" and t-statistics seen in equation 1.1 that there has been a convergence between Greece and the UK in respect of manufacturing shares in GDP during 1963-84.

Output increased by 274 % in Greek manufacturing industry and by 18 % in UK industry, showing that Greek industry has been catching up with the UK in respect of output.

Total manufacturing production in Greece and the UK was converted into a common currency (dollars, $) and their absolute differences were regressed against time. The equation found for the period 1963-84 is as follows:

Regression analysis of the absolute differences between the Greek and UK manufacturing output against time, 1963-84.

$$Y = 23616 - \underset{(-4.43)}{1291}\, T \qquad R^2 = 0.49 \quad d = 1.51 \qquad (1.2)$$

where Y represents the absolute differences between the manufacturing output in Greece and the UK; T is time, period 1963-84; t-statistics can be seen in brackets and t = 2.086 at a 5 % level of significance, a two-tail test.

Source: as table 3.1.

Equation 1.2 makes obvious that the differences between the two manufacturing industries, in terms of output, diminished over the period 1963-84.

During 1963-84, labour productivity grew by 150 % in Greek manufacturing and by 90 % in the UK showing, here again, that Greek industry has been catching up with the UK in terms of growth of output per labour. The differences between the two manufacturing sectors in respect of labour productivity (converted into a common currency, dollars $) were studied over time and the equation found is:

Regression analysis of the absolute differences between the labour productivities in Greek and UK manufacturing industries against time, 1963-84.

$$Y = 2254 - 31.6\,T \qquad R^2 = 0.33 \qquad (1.3)$$
$$\quad (-2.1) \qquad d = 1.45$$

where Y is the absolute difference between the output/labour ratios in Greek and UK manufacturing industries; T is time representing the period 1963-84; t-statistics can be seen in brackets and t = 2.080 at a 5 % level of significance, a two-tail test. Source: as table 4.22.

It is apparent from the coefficient in time "b" and the t-statistics, seen in equation 1.3, that the differences between the Greek and UK industries in respect of labour productivity diminished across the period 1963-84.

The pilot tests have shown that Greek manufacturing industry has been moving closer to the UK in respect of shares of manufacturing output in GDP; output and labour productivity during the period 1963-84.

d) the convergence hypothesis

As stated, this study is based on the claims of the development theory that intercountry comparisons are important in understanding the economic and industrial performance and identifying homogeneous features of development. Furthermore, the studies of Nadiri, Kintis and particularly Chassid demonstrated that Greek industry has been catching up with the UK. Preliminary tests in this thesis have supported this argument.

This thesis explores the possibility of Greek industry catching up with the UK following NEDO's model[12]. To date no comparative study between Greek and UK industries has been undertaken according to this model. The availability of data for Greek industry has permitted such a study; NEDO's model is fully discussed in appendix three. Since NEDO examines and compares the performance of UK and West German manufacturing industries in depth, it was seen as an appropriate model to follow so that homogeneous features of development between Greek and UK industries at an aggregate and disaggregate level are identified. Furthermore, since Greek industry is expected to be catching up with the UK, faster industrial growth in Greece than in the UK is anticipated and the differences between the two industries are expected to diminish over time.

This tendency for Greek manufacturing industry to catch up with the UK has been termed "convergence" for the purpose of this thesis. Convergence is defined as movement towards the same point in terms of output; capital and labour inputs, capital intensity, capital and labour productivities, and labour costs; total factor productivity and trade performance.

This project explores the convergence hypothesis between the Greek and UK manufacturing industries, during 1963-84. To facilitate this four hypotheses are devised and tested in chapters three to six. The hypotheses are:

Hypothesis one: There has been a convergence between Greek and UK manufacturing industries in terms of output;

Hypothesis two: Greek and UK manufacturing industries converged in respect of capital and labour inputs, capital intensity, capital and labour productivity, and labour costs;

Hypothesis three: Greek and UK manufacturing industries converged in terms of total factor productivity; and

Hypothesis four: A convergence was realized between Greek and UK manufacturing industries in respect of trade performance (that is relation of export performance in comparison to imports).

In terms of a comparative study between Greek and UK industry, the convergence hypothesis means that differences between the industries in respect of the above factors are diminishing. Given the economic position of each of these countries, this implies faster growth of Greek industry or slower growth of UK industry, or a combination of these.

Information gleaned from existing studies in this area and from pilot studies suggests that there is a tendency for industries in the UK and Greece to converge. Preliminary evidence also suggests that it is Greek industry's more rapid growth that will be the main contributor to convergence between the industries of the two countries.

- *NEDO's model and the present thesis*

As stated, this thesis explores the possibility of convergence between Greek and UK manufacturing industries following NEDO's model.

NEDO compared the UK and West German manufacturing industries during 1954-72 in respect of:

(i) output;

(ii) capital and labour inputs, capital intensity, capital and labour productivity;

(iii) total factor productivity;

(iv) trade performance; and

(v) company concentration, size of plant, and merger activity.

This thesis does not examine the concentration and merger activity of Greek and UK industries, due to lack of comparable statistical material.

The first hypothesis of this project will be studied following quite closely NEDO's model. While testing the second hypothesis the development of growth of labour costs will be considered that is outside NEDO's model.

The third hypothesis will examine total factor productivity in Greek and UK industries following NEDO's as well as Todd's[13] models. Furthermore, the contributions to growth of labour productivity in both manufacturing sectors will be studied that are not considered in NEDO. The estimation of growth of total factor productivity according to Todd's pattern is:

$$TFPg = Vg - TFIg \qquad (a)$$

$$TFIg = S_w\, Lg + (1 - S_w)\, Kg \qquad (b)$$

Therefore

$$TFPg = Vg - Kg - Sw\,(Lg - Kg) \qquad (c)$$

or alternatively

$$TFPg = Vg - Lg - S\pi\,(Kg - Lg) \qquad (d)$$

where $TFPg$ =growth of total factor productivity

$TFIg$ = growth of total factor input

Vg = growth of output

Lg = growth of labour input

Kg = growth of capital input

Sw = share of labour income

$S\pi$ = share of profits

Todd's model is a Solow's[14,8] measure based on the Cobb-Douglas production function with constant returns to scale and autonomous and neutral technological change.

The final hypothesis of this thesis referring to convergence between Greek and UK manufacturing industries in respect of trade performance (that is, in general terms, export performance in relation to imports) is studied following NEDO. Furthermore, it considers aggregate import and export demand functions according to Prodromidis and Anastassakou's[15] model that is demonstrated below.

The estimation of the aggregate import demand function is as follows:

$$IM/P_m = IM\ [\ Y,\ (\ 1 + d_m\ )\ P_m/P_d,\ z,\ u_m\ ]$$

where IM = value of manufactured imports (cif) at current prices

P_m = implicit price deflator of imports

Y = gross national product at constant prices

d_m = ratio of import duties at current prices to the current value of imports (cif)

P_d = wholesale price index

z = other relevant factors that may affect imports, especially dummy variables, and

u_m = random disturbance item.

The estimation of the aggregate export demand function is:

$$EX/P_x = EX\ [Y_w,\ VA,\ P_x/P_{wx},\ Z,\ U_x\ ]$$

where EX = value of manufactured exports (fob) at current prices

P_x = implicit price deflator of exports

Y_w = activity or demand variable of the rest of the world at constant prices

VA = activity or demand variable in real terms

P_{wx} = "world" unit value index of exports

Z = other relevant factors that may influence exports, and

U_x = random disturbance term.

Since this dissertation studies the convergence hypothesis between Greek and UK manufacturing industries regression analyses are run (that are outside NEDO's model) studying whether the differences between the two manufacturing sectors diminished over time in respect of output, capital and labour inputs, capital intensity, capital and labour productivities, total factor productivity and trade performance.

- *Data*

Most of the data for Greek manufacturing sector is published according to the international standard industrial classification (ISIC). For the UK there are several ways of classifying the different manufacturing industries from a variety of sources. Therefore, the UK data had to be adapted to correspond to the Greek data.

The different manufacturing industries that are examined for both Greece and the UK are as follows:

(1) Food manufacturing industries, except beverage industries.

(2) Beverage industries.

(3) Tobacco manufactures.

(4) Textiles.

(5) Manufacture of footwear, other wearing apparel and made-up textile goods.

(6) Manufactures of wood and cork, except manufacture of furniture.

(7) Manufacture of furniture and fixtures.

(8) Manufacture of paper and paper products.

(9) Printing and publishing industries.

(10) Manufacture of leather and leather and fur products, except footwear and other wearing apparel.

(11) Manufacture of rubber and plastic products.

(12) Manufacture of chemicals and chemical products.

(13) Manufacture of products of petroleum and coal.

(14) Manufacture of non-metallic mineral products, except products of petroleum and coal.

(15) Basic metal industries.

(16) Manufacture of metal products, except machinery and transport equipment.

(17) Manufacture of machinery, except electrical machinery.

(18) Manufacture of electrical machinery, apparatus, appliances and supplies.

(19) Manufacture of transport equipment.

(20) Miscellaneous manufacturing industries.

The starting point of this thesis was decided to be 1963 and the ending point 1984 due to restricted data for Greek industry at a disaggregated level outside the period 1963 to 1984. The benchmark years were chosen to be 1963, 1968, 1974, 1978 and 1984 due to data limitations (the choice of benchmark years is discussed further in appendix one).

Most data concerning Greece and the UK, used in this thesis refer to national prices, that is Drachmas for Greece and Pounds

Sterling for the UK. The data sets are adjusted into 1974 constant prices, as 1974 is approximately the mid-term of the period examined, 1963-84, and for this year most statistical information required for this study is available. In the cases where the differences between the total Greek and UK industries are studied over time in respect of output, capital, capital intensity, labour productivity, and labour costs, their values are converted into a common currency (dollars, $).

This thesis involves time-series and cross-sectional analysis.

- *outline of this study*

Chapter two considers a review of literature concerning the measurement and concept of productivity attempting to provide a background to this comparative study between Greek and UK manufacturing industries. At first, productivity is defined and partial productivity indices of labour and capital as well as total factor productivity estimates are discussed. Furthermore, the concept of productivity and its estimation together with Verdoorn's Law and its controversies are taken into consideration. Different approaches for the estimation of productivity in individual countries including Greece and the UK are discussed. The final part of this chapter considers comparative approaches for the calculation of productivity at the industry level and of the overall economy.

Chapter three examines the first hypothesis of this study which considers convergence in terms of output which is defined as gross domestic product (GDP). The components of Greek and UK industries are considered which are mining and quarrying, manufacturing, electricity, gas and water. The reason being to see the importance of the two manufacturing sectors in relation to their industries and then the Greek and UK industries in respect of gross domestic product.

The focus of the analysis of chapter three is then turned to the two manufacturing sectors and their distributions and patterns of growth are examined. Furthermore, the differences between the two manufacturing industries in respect of output are examined over the period 1963-84. It is shown diagramatically the different factors that contributed to the growth of output in Greek and UK manufacturing sectors. Finally, the question of whether there is any association between stability and growth in Greek and UK manufacturing industries is examined.

Chapter four studies the convergence hypothesis in terms of capital and labour (gross fixed capital stock, numbers of people employed), capital intensity (measured as gross fixed capital stock to labour input), labour productivity (output per unit of labour), capital productivity (output per unit of capital) and labour costs. The distribution and growth of capital stock and labour is analysed. The differences between the Greek and UK industries in respect of factor inputs are studied. The association of growth of factor inputs to growth of output is also examined. Then the association between capital stock growth and labour input growth, after removing the influence of output growth from both factor inputs, is considered. The structure and growth of capital intensity as well as the differences between the Greek and UK industries in terms of capital intensity are also tested. The patterns of growth of capital and labour productivities as well as their associations to output growth are considered. Furthermore, the absolute differences between the Greek and UK industries in respect of labour and capital productivities are studied.

In chapter four, consideration is given to whether the growth of labour productivity in Greece and the UK was due to the restructuring of employment toward high productivity and away from low productivity industries or due to labour productivity changes within individual industries. Finally, the growth of labour costs and unit labour costs are studied for both Greek and UK manufacturing sectors. The differences between the Greek and UK industries in terms of labour costs are examined over the period 1963-84.

Chapter five examines the third hypothesis of this thesis that convergence was realized between Greek and UK manufacturing industries in terms of total factor productivity between 1963 and 1984. The growth of total factor productivity of Greek and UK manufacturing industries is estimated according to NEDO's as well as Todd's models. To estimate total factor productivity growth, it is necessary first to calculate the rate of return on capital in order to measure the shares of labour and capital on output at the base year 1974. The discrepancies between the Greek and UK manufacturing industries in respect of total factor productivity are studied. The relationship between the growth of total factor productivity and partial productivities for both Greek and UK manufacturing industries is then investigated. The contributors to growth of output and labour productivity in Greek and UK industries are examined.

Chapter six studies the fourth and final hypothesis of convergence in respect of trade. The general picture of trade performance of total Greek and UK manufacturing sectors is given across the period 1963-84. That is, the total manufactured exports and imports of both countries as well as their trade balance and importance in relation to their gross domestic product are shown diagramatically.

Import and export demand functions are estimated following Prodromidis and Anastassakou model in order to see what are the factors that influenced most the total manufactured imports and exports in both countries over the entire period examined.

The distribution and growth of imports and exports of both Greek and UK manufacturing sectors are then studied. Furthermore, the association between the percentage distributions of output and exports in both industries is examined. The export/import ratio is studied for both Greek and UK manufacturing sectors, since this ratio is a measure of competitiveness in foreign trade. The differences between the Greek and UK total manufacturing sectors in respect of export/import ratios are considered over time. Import penetration (defined as the percentage share of imports in domestic consumption which is calculated by adding imports to gross output and subtracting exports) is then evaluated for both Greek and UK industries.

Finally, exports in relation to gross output and trade competitiveness (defined as the difference between exports and imports divided by their sum) is assessed for both Greek and UK manufacturing industries. The absolute differences between the Greek and UK manufacturing industries in respect of trade balance ratios are examined over the period 1963-84.

Chapter seven summarizes the main findings of this dissertation and discusses issues for future research.

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CHAPTER TWO

REVIEW OF LITERATURE CONCERNING THE MEASUREMENT AND CONCEPT OF PRODUCTIVITY.

This dissertation addresses comparative performance between Greek and UK manufacturing industries. The key factor in understanding the performance of industries of each of the countries is the measurement of productivity. Therefore, the purpose of this chapter is to discuss different issues concerning the meaning and estimation of productivity.

Firstly, the significance of productivity and the distinction between partial and total factor productivity is discussed; both of these measures are employed in the later analysis. Secondly, the Verdoorn's Law is considered which is taken up in the later analysis. In addition measures of productivity applied in different countries and comparative performance measures provide a useful background to this comparative study of Greek and UK industries.

A. MEANING OF PRODUCTIVITY

This section will address the importance of productivity. General approaches for the estimation of partial and total factor productivity will be discussed.

Productivity is the best general measure of a country's ability to create a high and rising standard of living for each of its citizens. Productivity growth is both the cause and the consequence of the development of dynamic forces operative in an economy - technical progress, accumulation of human and physical capital, enterprise, and institutional arrangements.

Its measurement and the explanation of its behaviour at the microeconomic and the macroeconomic levels require the unravelling of many complex factors; it is a task that has been a major challenge to economists and of extreme importance to entrepreneurs and government policy-makers.

Productivity is usually estimated as a ratio of output to inputs. There are, therefore, at least as many indices of productivity as there are factors of production. While each index has its own use, the most important are the partial productivity indices of labour and capital and the total or the multifactor productivity index. The former indices are simply the average products of labour, or capital, while total factor productivity, often referred to as the "residual" or the index of "technical progress", is defined as output per unit of labour and capital put together.

At one time it was fashionable to estimate technical progress simply in terms of the productivity of one factor alone -usually labour- but as a mark of technical progress this "partial" approach is now rightly eliminated since it considers only one factor when there are at least two measurable factors of production, if not more.

Symbolically, these indices are:

(i) Partial indices :

$AP_L = Q/L$ (labour productivity) ;

$AP_K = Q/K$ (capital productivity)

where AP_L and AP_K are, respectively, the average products of labour and capital.

(ii) Total factor productivity indices :

(1) $P = Q/(aL+bK)$ measured arithmetically;

$Q = PL^aK^b$ measured geometrically (Cobb-Douglas function) where Q, L and K are , respectively, the aggregate level of output, labour and capital inputs; a and b are some appropriate weights and P is the total factor productivity.

There are many ways of estimating total factor productivity, but the two indices most often applied in empirical research are Kendrick's arithmetic measure[1,2] and Solow's geometric index[3,2].

Kendrick approached measurement of total factor productivity, that is dA/A, using a distribution equation. He presumed a homogeneous production function and the Euler condition to obtain the following formula:

$$dA/A = ((Q_1/Q_0) / ((wL_1+rK_1)/(wL_0+rK_0))) - 1$$

where dA/A is rate of growth of productivity; w and r are the wage rate and the rate of return on capital respectively; variables with the subscript 1 refer to the current period and those with the subscript 0 refer to the base period.

In empirical calculations the weights for the above equation are allowed to change smoothly over time.

Solow's estimate was based on the Cobb-Douglas production function with constant returns to scale, autonomous and neutral technological change and perfect competition :

$$(2) \quad dA/A = (dQ/Q)-(adL/L+bdK/K); \quad b = 1-a$$

where dA/A is the rate of growth of productivity, a and b are the shares of labour and capital and dQ, dL and dK are the time derivatives of Q, L and K respectively.

This thesis examines capital and labour productivities, as illustrated above, and total factor productivity according to equations (1) and (2) for Greek and UK manufacturing industries at an aggregate and disaggregate level.

B. THE VERDOORN LAW AND ITS CONTROVERSIES

NEDO's model, discussed in chapter one, considers Verdoorn's Law in its analysis between UK and West German manufacturing industries. Having adopted the NEDO model in this dissertation, it is important to also consider Verdoorn's Law as it relates to labour productivity growth and output growth, the two major factors that this project studies. The Law is applied later in chapter four; this section explains the theoretical background of the Law and its controversies.

Verdoorn[4] used national data on growth in employment and output for fifteen countries in the interwar period and, separately, for individual sectors from four countries. The purpose was to examine whether there was any relationship between the growth of manufacturing productivity and output. Verdoorn found a positive relation between the rate of growth of labour productivity and the rate of growth of output. This statistical relationship has become known as Verdoorn's Law.

Lord Kaldor[5] in his inaugural lecture in 1966 adduced the Verdoorn Law as evidence of substantial economies of scale. He estimated the Law by using cross-sectional data for total manufacturing of twelve countries in the period 1953-54 to 1963-64.

Kaldor's results are summarised in two regression equations, productivity on output, and employment on output -which are two different ways of looking at the relationship between the growth of manufacturing labour productivity and output- and which suggest that the growth of output must have played an important role in the determination of productivity growth rates.

The regression equations are as follows:

(1) Rate of growth of productivity (P) on the rate of growth of manufacturing production (X) :

$$P = 1.035 + 0.484X \qquad R^2 = 0.826$$
$$SEE = 0.070$$

(2) Rate of growth of employment (E) on rate of growth of manufacturing production (X) :

$$E = -1.028 + 0.516X \qquad R^2 = 0.844$$
$$SEE = 0.070$$

The relationships by the usual tests are shown to be highly significant. They imply that apart from an "autonomous" rate of productivity growth of around 1 per cent a year, the latter is a function of the growth in total output: each percentage addition to the growth of output requires a 0.5 per cent increase in the growth of employment in terms of manhours, and is associated with 0.5 per cent increase in the growth of productivity. These coefficients are very similar to those found by Verdoorn and other investigators.

So the "Verdoorn Law" asserts that with a higher rate of growth of output, both productivity and employment increase at a faster rate. This relationship was also examined in respect of other sectors of the economy during the period 1953-64 for which comparable data could be found in the O.E.C.D. statistics, that is public utilities (gas, electricity and water) and construction; agriculture and mining; transport and communications and commerce.

Lord Kaldor concluded that the Verdoorn relationship applies not only to manufacturing activities but also to the industrial sector generally. But its application outside the industrial arena is clearly far more limited.

It certainly does not apply, on the evidence of the statistics, to agriculture and mining where the growth of productivity has exceeded the growth of production for every single country; and the growth in productivity has owed nothing to increasing returns to scale.

In case of transport and communications, there is no relation between productivity growth and output growth where productivity growth appears to have been fully autonomous, and owed nothing to economies of scale. Finally, in the case of commerce, there is a high correlation between productivity growth and output growth but no association between the growth of employment and of output.

McCombie and DeRidder[6] were concerned with Lord Kaldor's argument that the Verdoorn Law demonstrates the presence of substantial economies of scale and also his procedure of estimating the Verdoorn Law using cross-sectional data for total manufacturing. Their approach was based on the argument that the use of international data in estimating the Verdoorn Law has been exhausted and the estimation of more complex models using this data is unlikely to be very illuminating.

McCombie and DeRidder estimated Verdoorn's Law for 49 states of United States over the period 1963-73. Employment was defined as the total number of wage and salary earners. Output was value added and the reported data, in current prices, were deflated to constant prices at the two digit Standard Industrial Classification level and the statistics added to obtain total manufacturing output.

Three separate proxies were constructed for the growth of the non-labour inputs as there were no estimates for state capital stock at constant prices. The first was the gross investment-output ratio. The second estimate for the growth of capital (K1) was measured by McCombie and DeRidder and was based on a form of the perpetual inventory model and the appliance of cumulative gross investment at constant prices. The third proxy (K2) was the growth of this historic cost valuation which they converted to constant prices using national weights and price deflators.

It is encouraging to mention that there was a close association between K1 and K2 with a coefficient of determination of over 0.8. As the choice of capital proxy did not make a significant difference to the results, those obtained using only K1 were reported by the authors here.

McCombie and DeRidder quoted the following equation:

$$e = a_1 + b_1 q + b_2 K$$

where e, q and K are the growth rates of employment, output and capital respectively.

The degree of returns to scale (v) was given by $(1-b_2) / b_1$. Furthermore, the authors quoted Rowthorn's specification which was given by:

$$q = a_1^* + b_1^* e + b_2^* K$$

with the degree of returns to scale given by $b_1^* + b_2^*$

The results of the estimation of the Verdoorn Law, together with Rawthorn's description, provided strong confirmation of the hypothesis that manufacturing industry is subject to substantial economies of scale. But both estimates of returns to scale were subject to bias due to the problem of simultaneity.

Therefore, McCombie and DeRidder quoted Kennedy and Foley's[6] different approach for a better specification of the Verdoorn Law. Kennedy and Foley used the growth of total inputs rather than employment on the dependent variable, so both employment and capital growth were functions of the growth of capital. They specified the Verdoorn Law as :

$$f = a_1 + b_1 q$$

where $f = a^*K + b^*e$, $a^* + b^* = 1$, f is the growth of the sum of the factor inputs, suitably weighted, q is the growth of output and b_1 is an estimate of the reciprocal of the degree of returns to scale.

In order to weight the inputs the "growth accounting approach" was examined and the relevant factor shares were followed. The results together with Rowthorn's specification (with f as the regressor) are recorded in equations a and b in Table 1.

The Verdoorn Law was also estimated by instrumental variable approaches. Three procedures were used, namely, Bartlett's grouping method, Durbin's ranking method and the use of lagged variables as instruments (equations c-h in Table 1).

In the last approach, the instruments used for the Verdoorn Law were output growth over the periods 1947-58 and 1958-63. In the case of Rowthorn's specification, employment growth was used as the instrument. The estimates of the degree of returns to scale from all eight equations ranged from 1.33 to 1.65 depending upon the exact specification of the regression equation. These results strengthened Kaldor's argument about the vital significance of increasing returns in the growth of the advanced countries.

A further anomaly that was detected with the use of international data was that when logarithmic values of the levels of the various variables were used, rather than exponential growth rates, either constant or comparatively very small returns to scale were discovered. This result was consistent with the utilisation of regional data.

Kaldor considered the external economies of scale very important following Adam Smith's dictum that the degree of division of labour was restricted by the extent of the market.

U.S state data permitted McCombie and DeRidder to examine a specification of this hypothesis through the utilisation of the income potential as an estimate of the degree of externality. While it was only possible to do this for the "static" specifications, the income potential proved to be statistically significant which indicated that external economies of scale were a significant determinant of the level of productivity in manufacturing.

The most probable explanation of the disparity of results between the dynamic and static laws was that the conventional Cobb-Douglas production function was not the proper underlying structure of the Verdoorn Law.

Consequently, the estimate of increasing returns derived from the static law would be biased. Unfortunately, it was not possible to identify the accurate functional form emphasising the dynamic Verdoorn Law. The main conclusion of this paper was that dynamic increasing returns to scale were a significant factor in underlying productivity growth.

While a full treatment of the determinants of the relations between output growth and productivity for a sector as large as manufacturing would necessitate a multi-sector macro-economic model, Boulier[7] thought some insight into the empirical research on Verdoorn's Law could be gained through the examination of a relatively simple micro-economic model.

Hence, he looked at the relations between the elasticity of labour productivity in accordance to output and variables such as returns to scale, characteristics of factor supply, and technical progress for a profit-maximising monopolist.

He indicated that empirical findings relating output growth to productivity growth do not necessarily point out that there are increasing returns to scale, do not sustain the hypothesis that limitations on the supply of labour necessarily obstruct growth in labour productivity, and do not provide evidence on the nature of technical progress.

Boulier started with a simple model where the firm's profits equal the difference between revenue and expenditure on inputs:

$$p = Px - rK - wL$$

where p denotes profits, P the price of output, x is output, r the price of capital services, K capital services, w the wage rate and L the labour.

Boulier gave the value of the elasticity of labour productivity with respect to output for the above profit-maximising model as follows:

$$V = [(\alpha+\beta\epsilon-1)n-(\alpha+\beta\epsilon-1)pl+(1+p-\epsilon p)\tilde{O}+[p(1-\alpha-\beta)-\beta]\delta/n-\beta(1+p-\epsilon p)r^{\circ}/r]/$$
$$[\alpha n-\alpha lp+(1+p)\tilde{O}-(\alpha p+\beta p+\beta)\delta/n-\beta(p+1)r^{\circ}/r] \quad (3)$$

where V is the elasticity of labour productivity; α and β are the output elasticity of labour and capital services respectively; r is the price of capital services; δ is the constant annual rate; n is the constant price elasticity of the demand for output; l reflects the influence of the demand for labour by other firms on the supply of labour to the monopolist; $\tilde{O}$ is the rate of technological progress; $\epsilon=(n+1)/n$ and since $-\infty \leq n < -1$, then $0 < \epsilon \leq 1$; p (>0) is the wage elasticity of the supply of labour to the firm; and r°/r is the rate of change of the price of capital.

Equation (3) indicates that V depends on the set of parameters characterising the production function, factor supply and output demand. Furthermore, without knowledge of the particular parameters, it was not even possible to detect whether V would increase or decrease in response to a change in any one of the parameters.

Boulier concluded that little weight should be affixed to inferences about the extent of economies of scale, the nature of technological progress, or labour supply elasticities that emerged from comparisons of Verdoorn's elasticity for the same industry in different countries or for different industries within a country.

Table 1

THE VERDOORN LAW USING TOTAL FACTOR INPUT

U.S Manufacturing: state data 1963-73

(i) Ordinary-least squares estimates; n=49

	dep. var	constant	d_1	d_2	d_3	q	$\bar{R}^2$	SEE
(a)	f	-1.412	0.972	0.321	1.161	0.606	0.866	0.568
		(-5.52)	(3.86)	(1.21)	(4.41)	(14.44)		

	dep. var	constant	d_1	d_2	d_3	f	$\bar{R}^2$	SEE
(b)	q	2.640	-0.945	-0.082	-1.319	1.363	0.838	0.853
		(8.75)	(-2.29)	(-0.2)	(-3.07)	(14.44)		

(ii) Instrumental variable estimates

(A) Bartlett's grouping method; n=32

	dep. var	constant	d_1	d_2	d_3	q	$\bar{R}^2$	SEE
(c)	f	-1.659	1.042	-0.039	1.053	0.644	0.9	0.58
		(-5.69)	(3.46)	(-1.05)	(3.37)	(13.09)		

	dep. var	constant	d_1	d_2	d_3	f	$\bar{R}^2$	SEE
(d)	q	2.666	-1.514	0.427	-1.76	1.489	0.882	0.867
		(8.26)	(-3.13)	(0.69)	(-3.42)	(13.46)		

(B) Durbin's ranking method; n=49

	dep. var	constant	d_1	d_2	d_3	q	$\bar{R}^2$	SEE
(e)	f	-1.534	0.907	0.26	1.117	0.635	0.864	0.572
		(-5.87)	(3.57)	(0.97)	(4.21)	(14.61)		

	dep. var	constant	d_1	d_2	d_3	f	$\bar{R}_2$	SEE
(f)	q	2.646	-0.93	-0.072	-1.307	1.357	0.838	0.853
		(8.76)	(-2.24)	(-0.18)	(-3.02)	(14.21)		

(C) Lagged variables as instruments; n=49

	dep. var	constant	d_1	d_2	d_3	q	$\bar{R}^2$	SEE
(g)	f	-1.775	0.779	0.14	1.028	0.695	0.852	0.596
		(-3.61)	(2.27)	(0.41)	(3.26)	(6.32)		

	dep. var	constant	d_1	d_2	d_3	f	$\bar{R}^2$	SEE
(h)	q	2.594	-1.042	-0.148	-1.408	1.406	0.837	0.854
		(7.91)	(-2.11)	(-0.33)	(-2.84)	(9.32)		

Estimates of returns to scale (v)

Equations:	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
v :	1.65	1.36	1.55	1.49	1.57	1.36	1.43	1.41

source: McCombie and DeRidder[6]

All estimates are significantly greater than unity at 0.99 confidence level. Variables f, q are the growth of total factor input and output respectively; the d's are regional dummies; figures in parentheses are the t values; SEE is the standard error of the equation.

The findings in this dissertation (chapter four) support the positive relation between the rate of growth of labour productivity and the rate of growth of output.

C. MEASUREMENT OF PRODUCTIVITY IN INDIVIDUAL COUNTRIES.

This part of the analysis is examining different approaches for estimating productivity of industrial sectors and in particular of manufacturing industries of different countries.

The main object of Todd's[8] analysis was the evaluation of total factor productivity growth and the productivity slowdown in the W. German industrial sector during the period 1970-81. The sectors of W. German industry to which the analysis refers are three industries in Mining, together with thirty two industries in Manufacturing that is thirty five in all.

The analysis was placed in a growth accounting structure that set emphasis on the relative contributions of factor inputs to total output growth with reference to a base year 1976.

$$TFP_g = V_g - K_g - S_w(L_g - K_g) \text{ or alternatively}$$

$$TFP_g = V_g - L_g - S_\pi(K_g - L_g)$$

where TFP_g = growth of total factor productivity

V_g = growth of output

L_g = growth of labour input

K_g = growth of capital input

S_w = share of labour income

S_π = share of profits

The ground for the above functions was a Solow-type production function with Hicks-neutral technical progress of the form $V = A(t), \quad F(L,K)$. Output volume was specified as gross value added where the labour input was numbers employed with the volume of capital determined as gross fixed assets.

Todd concluded that even though capital productivity tended to decline in particular since 1973, those industries which have succeeded in attaining above average growth of real output, have also achieved higher than average capital productivity. Furthermore, total factor productivity growth and capital/labour substitution contributed to the growth in output per head and the slowdown in this rate of increase in generally equal proportions.

Todd[9] in a more recent paper, examined the productive performance of thirty two sectors of W. German manufacturing industry over the period 1970-80, using the Farrell Frontier methodology. According to the more general form of Farrell's[10] technique, the production function defines either a maximum output yielded by given inputs, or alternatively the minimum inputs required to achieve a given output.

Unlike the more conventional production function approach, the Farrell method used rigorously is a non-parametric technique. It is therefore nearly impossible to practice the usual classical methods of statistical inference.

Todd's analysis was sustained on observations on net output volume, capacity net output, numbers employed, average hours worked, wages and salaries per employee and the volume of fixed assets. The observations on output and capital were stated in terms of base year 1970.

He concluded that the West German manufacturing growth has slowed down over the period examined. The leading and declining sectors in Farrell efficiency terms have modified little over the past decade. There has been a slight movement between the various sectors, with improvements in labour productivity being offset to some extent by declining capital productivity. The productive efficiency frontier moved inwards drifting in a more capital intensive direction.

The intent of the study of Zohar[11] was to analyse labour and capital productivity as well as the impact of technological change on Canadian manufacturing industries over the period 1946-77. To succeed in this goal, the variables and parameters involved in the manufacturing sector as a whole were looked at.

This study used four different sorts of econometric production functions to indicate the marginal contribution of individual factors of production in nineteen manufacturing industries. The four different production functions were: Cobb-Douglas; constant elasticity of substitution; variable elasticity of substitution; and the translog approximation of the constant elasticity of substitution. Other factors such as elasticities of substitution, economies of scale, capacity utilisation and elasticity of substitution were also examined.

The main conclusion of Zohar's analysis was that the productivity decline of Canadian manufacturing industry could be attributed more to inefficiencies in the use of capital than labour. The growth in overall efficiency and labour productivity have stalled over the period examined.

There has been another analysis of the performance of Canadian manufacturing carried out this time by Gupta[12]. He estimated a simultaneous equation model endogenising five aspects such as concentration, foreign ownership, advertising, sub-optimal capacity, and price-cost margin. Gupta examined this model using cross-section data around 1968 for a sample of 67 industries representing 4/5 of the total shipments of the manufacturing sector of Canada. The simultaneity bias was found important in the determination of some of the above aspects.

Gupta's findings indicated that public policy for ameliorating market performance should be focused at improving the barriers-to-entry factor of market structure and conduct, rather than concentrated market structure itself.

The relationship between technical efficiency, the choice of technique, and economic performance for three major industries in Ghana -logging, sawmilling and furniture manufacturing- has been explored by Page[13] between the years 1972 and 1973.

As a measurement of economic efficiency, resource cost ratios were estimated using firm level observations from the three mentioned above industries in Ghana. The developed resource cost ratio was written as follows:

$$\frac{\Sigma^{m}{}_{s}\, f_{sj} P^{\circ}{}_{s}}{P^{\circ}{}_{j} - \Sigma^{n}{}_{i} a_{ij} P^{\circ}{}_{i}} \quad \begin{matrix} < \\ = \\ > \end{matrix} \quad 1$$

where $P^{\circ}{}_{j}$ = accounting value of output j

a_{ij} = input of material i per unit of output j

$P^{\circ}{}_{i}$ = accounting price of input i

f_{sj} = input of primary factor s per unit of output j

$P^{\circ}{}_{s}$ = accounting price of factor s.

According to the Farrell criterion, firms with minimum resource cost ratios achieve the highest levels of overall efficiency.

The production function measures help appraising the extent of technical and price inefficiency in the three industries. Therefore, frontier production functions had been examined for each of the three industries as well as average production functions, measured by ordinary least squares.

All three industries showed comparatively high levels of average efficiency. It is improbable that for most industries a change in relative factor prices could have much influence on current production methods. The results of Page's analysis indicated that the level of technical efficiency may be an equally significant causation of economic performance in developing countries.

Silver[14] considered the growth and features of the development of Tanzania's manufacturing sector from the start of colonial rule in 1884 until 1972.

Factors that were looked at in detail were such as labour productivity, earnings, unit labour costs, investments and the price of manufactured products. The role of the government parastatal sector (that is establishments with an at least majority government shareholding) was particularly emphasized as well as the regional distribution of manufacturing industry and income inequality.

Silver found that during the colonial period 1884-1961, the manufacturing sector developed rapidly. The post-Independence period 1961-1972 saw a rapid growth in production and employment that originated from a small number of relatively large establishments.

Kintis[15] looked at the structure, conduct and performance of the Greek industry over the period 1958-78. The indicators examined for the measurement of productivity were: labour productivity and capital productivity.

Labour productivity was defined as value added per labour. Three factors were considered for the analysis of capital productivity: investment ratios, incremental capital-output ratios and marginal productivity of capital.

The analysis concluded that since the second world war the manufacturing sector developed remarkably but there have been structural problems that need to be solved.

A study in Economicos Tachedromos[16] examined the performance of the Greek industry prior to the second world war until mid-80's. It looked at the development of the contribution of the manufacturing sector in the gross domestic product (GDP) that from 18.7 per cent in 1959-60 reached 19.93 per cent in 1974-75 and 20.2 per cent in 1982-83. The measurement of industry performance required the examination of a number of indicators: investment, profitability, trade performance, capital productivity and labour productivity. The analysis concluded that the Greek industrial revolution mainly ended in 1975-77.

Sargent[17] undertook an analysis of productivity and profitability in UK manufacturing industry over the period 1950-76. He was mainly concerned with trends in productivity and profitability in UK manufacturing rather than with the fluctuations which can be assigned to cyclical changes in the growth of demand.

Sargent looked at labour productivity, capital productivity, labour hours worked, as well as capital per labour hour. Furthermore, profitability was examined that specified a rate of return, or ratio of current profits net of the required provision for replacing those assets at current replacement costs of physical assets.

A decelerating trend in the growth rate of capital per labour hour in UK manufacturing industry has been found. This followed the reduction of the growth rate of labour productivity since the early 1970's.

Another study of the productivity performance of UK industries was carried out by Wenban-Smith[18]. He examined the movement of output per employee in one hundred and sixty industries between 1968 and 1979. The main focus of the study was the comparison of productivity movements before and after 1973.

The analysis reached the conclusion that since 1973 most individual industries experienced a slowdown in productivity and output growth rates and that there has not been detected a shift in the relation between productivity and output growth.

Jones and Cockerill[19] looked at the performance of British industry as a whole as well as at particular industries such as construction, electricity supply, pharmaceuticals, steel industry and brewing industry between 1950 and 1982.

They reviewed the place of industry in the economy, the theory of the relationships between structure, conduct and performance, and the development and effects of public policy. The performance of the UK manufacturing sector was examined in terms of profitability, growth, productivity and investment.

Their study showed that British manufacturing has not performed well. The declining share of manufacturing employment in total employment and the declining share in GDP was given the term de-industrialisation.

Productivity and competitiveness in British manufacturing industry over the period 1956-85 has been examined by Muellbauer[20].

To explain productivity change in British manufacturing an empirical form of the Cobb-Douglas production function was considered. It was estimated for 1956Q1-1985Q4 and took the following form:

$\ln Q$ = constant + seasonals + effect of unusual temperatures on first quarter output + miners strike effects in 1972Q1 and 1974Q1 + 0.667 ($\ln WW + \ln h + \ln L$) + $0.333 \ln K$ + output bias + trends shifting in 1959Q4, 1973Q1, 1979Q3 and 1980Q4.

where WW was a measure of the number of working weeks per annum. This was specified as 52-1/5 (number of public holidays) - average weeks of paid holidays from national agreements. Q was real value added, L was the number of workers, K was the capital stock, and h was effective weekly hours of work. Effective hours were defined so that $\ln h = \ln h\sim + u$ where $h\sim$ was an index of normal hours (= 100 in 1955) and where

$$u = OH - \underset{(16.2)}{0.0182}\, OH^{-1} + \underset{(7.9)}{0.086}\, ((h\sim - 90.4)/100)\, OH^{-1}.$$

OH was defined as the ratio of total overtime hours of operatives to the total number of operatives times normal hours. The t-ratios in parenthesis were indicating that the parameter estimates were quite accurate. The output bias comprised four terms: the level of competitiveness pre-1970; the rate of change of competitiveness over 4 quarters; the rate of change of relative raw material prices over 3 quarters; and an estimate of the intensity of price controls defined by deflating a value measure of Price Commission intervention by the produced price index. The shifting time trends indicated the following annual rates of total factor productivity growth: 1956Q1 to 1959Q3 1.71% ; 1959Q4 to 1972Q4 2.63% ; 1973Q1 to 1979Q2 0.62% ; 1979Q3 to 1980Q2 -1.93% ; from 1980Q3 2.76%.

Muellbauer concluded that there has been a slowdown in productivity growth in 1973-80 that was realised not only in Britain but in virtually all OECD countries. The underlying trend of the productivity growth in British manufacturing from the second half of 1980 was a stable increase.

Todd's[8] approach for the estimation of total factor productivity is employed in this dissertation in chapter five. The findings of most (if not all) of the studies quoted in this sub-section referring to Greek and UK industries are compared to the findings of this project in chapters three to six.

D. COMPARATIVE PERFORMANCES

The present study will concentrate on comparative international performance of different sectors of economies. The main focus will be on comparative industrial performances.

Smith, Hitchens and Davies[21] attempted to compare the productivity of Britain, America and Germany over the period

1968-77. They focused mainly on the labour productivity differentials that emerged for agriculture, extractive industries, manufacturing, construction, public utilities and transport.

There were three stages involved for the measurement and comparison of labour productivity of Britain, America and Germany. First, sectors of the three economies were matched at the finest level which the data allowed. Second, there were mostly "other country" net output values, in the different sectors of the three economies, converted to £ sterling by international average value or price indices of the gross output of the activity examined. Third, the estimated labour productivity ratios were built up from the Minimum List Heading level to the sectoral level.

The productivity ratios were brought to a 1977 date, by applying each country's indices of output and employment to the main results.

The main conclusion of Smith, Hitchens and Davies's paper was that in 1977 American productivity of the six major sectors of the economy was 2.66 times better than Britain's, and Germany's 1.43 times better.

Jones[22] conducted a comparative study between the UK and six other Western European countries; Austria, Belgium, France, West Germany, Italy and the Netherlands over the period 1955-73.

He has built up series for output and employment for each of these countries for GDP as whole, six categories of GDP, and furthermore, six sub-sectors within manufacturing. Purchasing power parity rates were used so that the relative levels of labour productivity between countries were compared for GDP, manufacturing and the six sub-sectors of manufacturing.

Jones's results indicated that in 1955 labour productivity in the UK was 15 per cent higher than in France and Germany and 40 per cent higher than in Italy. In Belgium and the Netherlands, labour productivity was about 15 per cent higher than that of the UK. Since then, the labour productivity of all these countries has grown much faster than in the UK. By 1973 their level of labour productivity had surpassed that of the UK.

Jones's exercise of comparative studies was repeated six years later on by Roy[23]. He studied the levels of labour productivity in six EEC countries, the UK, Belgium, France, Germany, Italy, and the Netherlands; and in the U.S. and Japan over the period 1973-81. For each of the above countries he examined the division of GDP in 1973 between five main sectors: agriculture, fuel and power, manufacturing, construction and services. Within manufacturing itself, he looked at six broad groups of industry: food, beverages and tobacco; textiles, leather and clothing; chemicals; base metals; metal products; and other manufacturing.

Roy used purchasing power parities (PPPs) and each country's total output (GDP) -output in the six manufacturing divisions and output in agriculture, fuel and power, and construction- was expressed in dollar terms. The dollar value of the output of services was estimated by subtracting the output of the other four sectors from GDP (in dollars). The dollar figures for outputs of manufacturing and of services so obtained indicated certain values for the appropriate multilateral PPPs. The next step was to estimate productivity in terms of thousands of dollars per employed worker-year.

The main conclusion of Roy's analysis was that UK lost ground substantially between 1973 and 1980 but there was some improvement between 1980 and 1981.

The basic method used by Nyers[24] for the Austrian-Hungarian industrial productivity comparison between the years 1965 and 1975 was that of individual output indices. Productivity indices were specified as the quotient of output and labour input indices.

In the Austrian-Hungarian comparison, gross weights were used since unit prices existed for both countries. Nyers developed Laspeyres and Paasche type indices, applying as weights, first the price data of one country and then the other. Geometric averages were estimated for each comparison, and the interspacial Fisher type index was considered as the basis for evaluation.

In order to examine the performance of economic units by productivity level, gross production per unit of direct labour input was considered as the main indicator, and this was interpreted as an approximation of sector performance. Labour unit was estimated by only a single indicator, the production level per employee. The classification framework for the comparison was ISIC two-digit level branches.

Nyers concluded that the level of economic development was higher in Austria than in Hungary. In Austria, the share of industry in the gross domestic product was 31 per cent and that of tertiary branches 37 per cent in 1975. In the same year, Austria's industrial production represented around 85 per cent of Hungary's.

NEDO[25] gave another example of comparative studies of productivity by examining the performance of the British and German manufacturing industries.

This study developed and compared indices of total factor productivity (TFP) growth for different manufacturing industries in the United Kingdom and West Germany over the period 1954-72. The contribution of the different factors to the rate of output growth in these industries was evaluated.

The TFP index was defined and estimated as in equation (1) and was then applied in a growth accounting framework to differentiate the respective contributions of changes in labour inputs, capital inputs and other factors to output growth rates.

The labour input was measured as the number of persons employed in an industry in each year. Capital input index was defined as the gross fixed capital stock at constant price replacement cost. Labour and capital inputs were then combined into a single input index, according to the shares of labour and capital in net output in 1963. The weights differed between the two countries but not to a point that affected productivity growth comparisons between the two countries.

The conclusion reached from this analysis was that the relative failure of U.K. industry over the period 1954-72 was one of economic performance rather than structure.

Pratten[26] undertook a comparison between fifty U.K. companies and fifty Swedish companies matched as far as possible for product mix over the period 1968-73.

By looking at the manufacturing sectors of both countries he examined closely the two economies, distribution of labour force, growth of industrial output, international trade, and finally their extent of foreign ownership. Furthermore, the structure of both industries, their relationships with Banks and their sales and employment were evaluated.

Looking at other topics eg. sales and value added per employee, as well as labour productivity, he considered at first the domestic operations of both industries where labour productivity was ideally compared in terms of the average physical product per employee.

In addition, he looked at the prices of goods sold from both countries; their vertical integration and the sales per employee of the two manufacturing industries. The profits, taxation, dividends and the valuation of shares for both industries as well as their investments and international trade were also examined.

Pratten concluded that on average the Swedish companies were half as large, but more export-oriented and attained labour productivity about 50 per cent higher than their British counterparts.

Caves, Christensen and Dieward[27,28] suggested a valuable methodology for the computation of productivity indices for use in cross-country comparisons. They derived what they term "multilateral superlative indices" for use in the comparison of output, input and productivity across economic entities.

The indices derived were differentiated both by transitivity and by a high degree of "characteristicity". Though the indices were displayed with the application to multicountry comparisons of output, input and productivity foremost in mind, the authors indicated that they may be useful in a number of other contexts as well as in firms and industries.

All of the applications mentioned or implied, however, had one thing in common: they considered the comparison of productive entities all of whose surplus was sold for positive prices. However, this does cause incomplete or potentially misleading the comparison of productive entities which produce significant amounts of "undesirable" outputs, such as water and air pollution.

Since the list of such entities is rather long and involves industries very crucial to many national and regional economies, the omission of this factor from consideration may be very important.

Therefore, Pittman[28] proposed a revision to the above methodology which enables the analyst to include undesirable outputs as well as desirable outputs in the productivity calculus.

An empirical illustration suggested that such a revision did not result in massive changes in productivity rankings. It definitely did not remove, or even reduce, the variation in productivity noted by the original indexes. However, for those industries where undesirable outputs were important, the illustration showed that the revision resulted in some sizeable movements in the rankings. Such movements evolved a ranking structure which took into consideration more fully both the public and private factors of productivity.

The "translog multilateral productivity index" that Pittman derived was specified as the difference between the translog multilateral output and input indexes, that is :

$$\ln j^*_{kl} = \ln d^*_{kl} - \ln p^*_{kl}$$

where the first part of the right hand side of the equation is the translog multilateral output index and the second part is the translog multilateral input index and k, l are the two different countries for which the analysis was carried out.

To summarise, Pittman has derived a multilateral productivity index which comprises estimates of undesirable as well as desirable outputs. The form of the index was mainly similar to that of an index including normal outputs only, with the exception that undesirable outputs were "valued" by their shadow prices rather than their market prices.

Caves[29] compared British to American industries focusing on the influences on British productivity and the strength of these influences. He conducted a statistical analysis of the determinants of productivity levels of seventy one British industries over the years 1963-72.

He expressed the productivity of British industries as a fraction of that of their counterparts in U.S. His procedure started by matching rather finely disaggregated U.K manufacturing industries to their counterparts in the United States, using the standard industrial classification manuals of the two countries to guide the matching. The concept of productivity was as follows:

$$\frac{\text{market value of output}}{\text{social opportunity cost of the inputs necessary to produce it}}$$

A key assumption made by Caves in his analysis was that a given British or U.S. manufacturing industry was simply a part of a larger world industry and neither the British nor the U.S. one had a great influence in setting the world market price.

If this assumption held strictly, the values and volumes of output of the two industries would be proportional to one another. But because many distorting elements such as tariffs, transportation costs and factors of monopoly could cause this assumption to fail, Caves had to consider these factors in his study.

His statistical results supported the negative effect on industrial productivity of both poor labour-management relations and deficiencies in British management. The British industries that were performing well relative to their American counterparts, had been growing faster while those that were performing poorly had been falling further behind.

There has been a comparative study of productivity performance between British and German manufacturing plants during the period 1983-84 carried out by Daly, Hitchens and Wagner[30]. Their analysis was mainly based on some three dozen interviews with management and factory floor employees at 45 matched firms in the two countries. The central aim of their analysis was to illuminate how present-day productivity is affected by differences in the type of machinery used and by differences in the skills and qualifications of the labour force on the factory floor.

It was found that the average age of British machinery was not very different from that in German plants, but it was less technically sophisticated. Productivity was higher in Germany and the importance of skills was obvious in each of the matched product groups.

A special chapter in the 1987 OECD Economic Outlook[31] compared the developments in total factor productivity in member countries including Greece and the UK from the mid 1960's until 1985. It presented data on income per combined unit of labour at the aggregate as well as industry level for different OECD countries. TFP growth was as that part of real growth that was not accounted for by real increases in inputs of labour and capital. In this perceptive account, TFP growth was considered as a measure of technological progress. The weighted sum of the growth in labour productivity - real output per employed person - and capital productivity - real output per unit of capital - with 1985 factor shares used as weights was set equal to TFP growth. In addition, different structural and macroeconomic determinants behind the extensive slowdown in TFP growth since the late 1960's were also examined.

It was found that productivity growth in most OECD member countries including Greece and UK has been decreasing for the last two decades. Since the early 1980's there has been a sign of improvement of productivity growth for most OECD countries as well as UK although there is no evidence that these productivity trends will continue. There has not been any sign of progression of productivity growth in Greece since 1980.

Maddison[32] compared the performance of different economies such as France, Germany, Japan, Netherlands, UK and US during the period 1913-1984. He examined a simple set of comparative growth accounts to illuminate the causes of growth acceleration and deceleration of the above mentioned economies.

At first, he looked at the labour productivity, π^1, that was defined as the difference between the compound rate of increase in output, O, and the rate of increase in labour input, L, that is $\pi^1 = O - L$. Secondly, capital productivity was examined, π^2, that was defined as: $\pi^2 = O - K$ where K was gross capital stock growth. Then, joint factor productivity, π^3, was constructed by linking capital with labour and was specified as: $\pi^3 = O - aL - (1 - a) K$. In order to explain more of growth of factor productivity, π^3, augmented joint factor productivity, π^4, was estimated and the formula was: $\pi^4 = O - aL^* - (1-a) K^*$, where K^* was defined as "augmented" capital that was considered the capital quality effect such as the age of capital and L^* was specified as "augmented" labour that took into account adjustments such as education levels and hours of work. The final step was the movement from π^4 to the estimation of the π^5 "residual" measure that added nine significant elements i.e. changes in economic structure; the process of catching up of follower countries (that is all examined countries except US) on the leader (the US); foreign trade influences; economies of scale at the national level; the energy price eruption of 1973-84 and induced energy economy; effects of natural resource finding; costs of government regulation and crime; labour hoarding and dishoarding and the utilisation of capacity effects. The index for this growth accounting approach took the following form:

$$\pi^5 = O - aL^* - (1 - a)\ K^* - S$$

where S was the contribution to the rate of growth of factor productivity of the nine above mentioned supplementary elements.

Maddison indicated that since 1973, economic growth in the examined Western countries has slowed in terms of all relevant measures. The post war process of convergence by the five examined countries on the US has not been halted, although the productivity gap with the US is now smaller than ever before.

This sub-section provided a background to the comparative study of Greek and UK manufacturing industries. Furthermore, NEDO's[25] model was discussed which is followed in this project.

SUMMARY

This chapter has examined the concept and measurement of productivity and attempted to provide the background of this dissertation.

The analysis was carried out as follows:

a) Meaning of productivity. The context and significance of productivity was analysed. This has illuminated the importance of different ways for estimating productivity and has indicated the distinction between partial and total productivity indices.

b) Verdoorn law and its controversies. Verdoorn's theory, that suggested a positive relationship between the rate of growth of labour productivity and the rate of growth of output, has been discussed. Furthermore, the different controversies were considered.

c) Measurement of productivity in individual countries. This section has examined different approaches for the estimation of industrial productivity in countries around the world.

d) Comparative performances. This involved a discussion of comparative approaches for the calculation of productivity. The studies were international in their coverage and analysis took place at two levels. First, at the industry level and secondly, at the level of the overall economy.

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CHAPTER THREE

GROSS DOMESTIC PRODUCT BY INDUSTRIAL SECTOR AND TWENTY MANUFACTURING INDUSTRIES

A. INTRODUCTION

The purpose of this chapter is to study the first hypothesis of this project which argues that there was a convergence between Greek and UK manufacturing sectors in respect of output during 1963-84. A faster growth of output in Greek manufacturing industry in comparison to the UK is anticipated. Furthermore, absolute differences between the two manufacturing industries in respect of output will be expected to diminish over this period of time.

Although the main consideration of this chapter is the manufacturing sectors of both countries, the development of their industries will be considered at first. The industrial sector is defined as Mining and Quarrying, Manufacturing, and Electricity, Gas and Water. Mining and Quarrying comprises coal mining, crude petroleum and natural gas production, metal ore mining, and other mining. The Electricity, Gas and Water industrial sector includes the production of electricity, gas and water works and supply.

Here output is considered as gross domestic product (GDP) based on income for both countries, that is income from employment plus gross profits plus other income (see also appendix one).

The data in current prices concerning Greek industry were taken from the National Accounts Statistics. The data for Greek manufacturing industry at a disaggregated level was supplied by the Ministry of National Economy-National Accounts in Athens.

In order to have the Greek data into constant prices the deflator of the gross domestic product (1974 = 100) has been used and was provided by the Ministry of National Economy-National Accounts.

Turning our attention to the United Kingdom, the data at current prices for the components of the industry as a whole, (being defined as above for Greece) and in particular for the manufacturing industry, was extracted from the National Income and Expenditure.

The UK data was deflated into 1974 prices using the implied index numbers of costs and prices, shown as the index of total home costs, and was taken from the CSO Blue Book, UK National Accounts, 1985 ed.

The structure of this chapter is as follows:

B. Total Industrial Sector.

C. Manufacturing Industries.

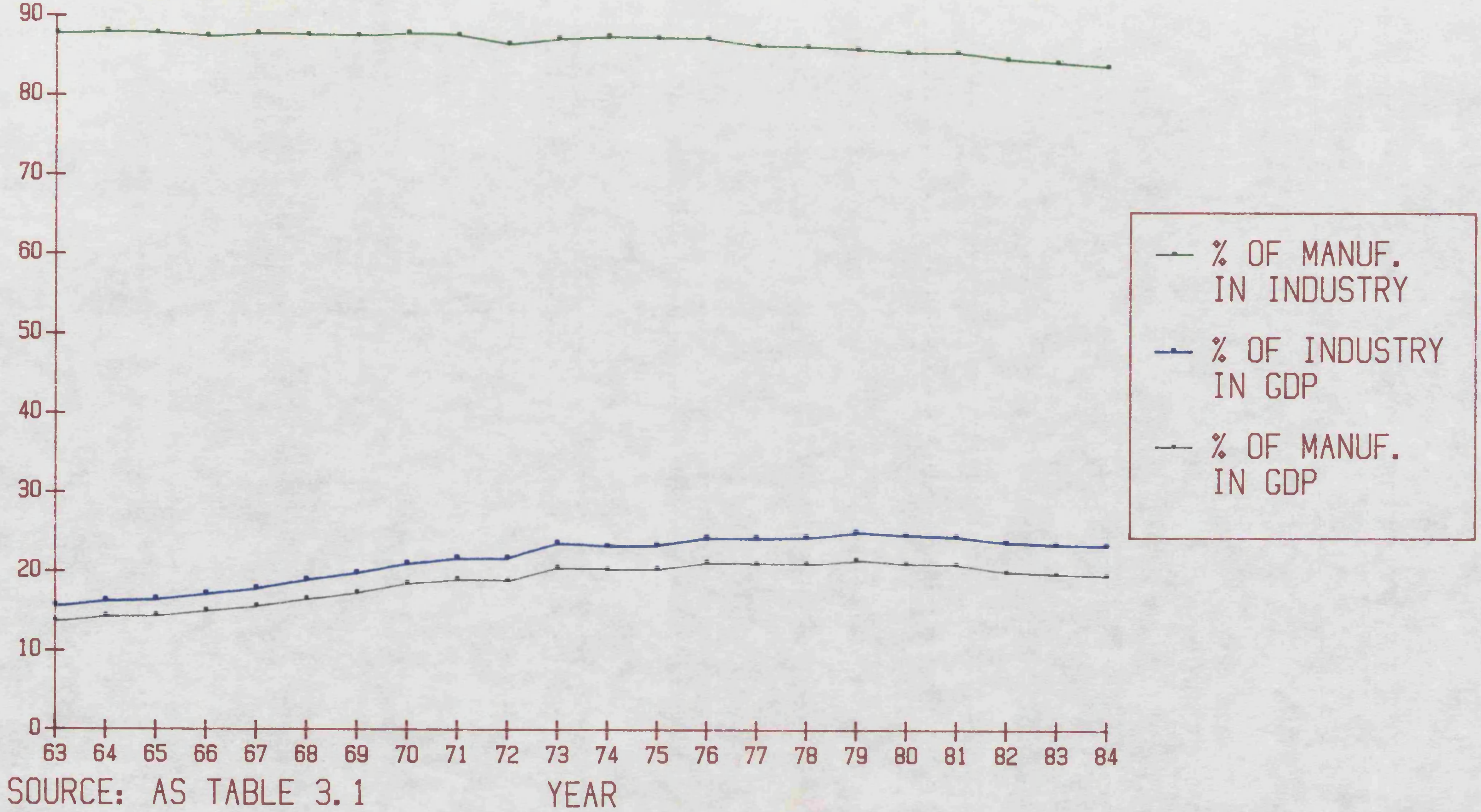
   (i) Sectoral pattern and growth of output in twenty manufacturing sectors.

   (ii) Relationship between stability and growth of twenty manufacturing sectors.

D. Conclusions.

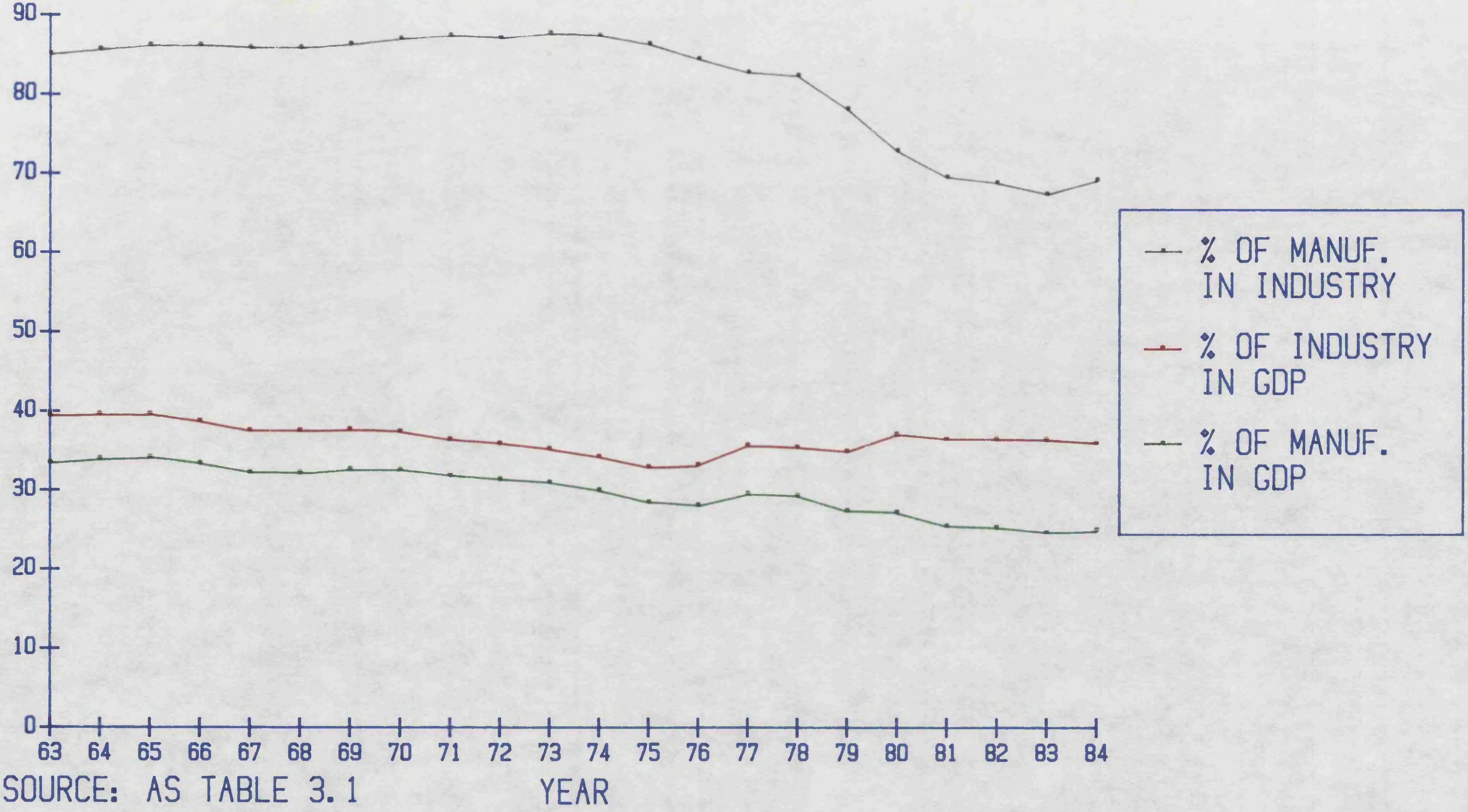
E. References.

FIGURE 3.1 GREECE



SOURCE: AS TABLE 3.1

FIGURE 3.2 UNITED KINGDOM



SOURCE: AS TABLE 3.1

B. TOTAL INDUSTRIAL SECTOR

This section studies the evolution of industry as a whole as well as its components.

Figure 3.1 shows (i) the percentage distribution of manufacturing in GDP, (ii) the share of total industry in gross domestic product (GDP) and (iii) the share of manufacturing in industry, in the period 1963-84. Figure 3.2 is equivalent for the UK.

It is apparent from figures 3.1 and 3.2 that although in 1963 the proportion of the UK manufacturing sector in GDP was much larger than in Greece, since then, their shares were getting closer. In 1984 the Greek and UK manufacturing industries represented respectively, 19.4 and 24.8 per cent of the gross domestic product.

In chapter one, the absolute differences between the shares of manufacturing output in GDP in both countries were regressed against time, 1963-84, in order to see whether the two distributions were getting closer as time was passing by.

It was apparent from the negative and significant coefficient in time "b", seen in equation 1.1 in chapter one, that there has been a convergence between the shares of Greek and UK manufacturing sectors in GDP during the period 1963-84.

Figures 3.1 and 3.2 show that at the beginning of the period examined, 1963, the share of UK industry in GDP was more than double that in Greece. Since then they were getting nearer to the same share. The share of industry in UK GDP has been decreasing more or less continuously since 1963 until 1975 when it started increasing quite substantially until 1980 only to start slowing down again. For Greece there has been an increase until 1979 when it started decreasing. In 1984 the share of the Greek and UK industry in the GDP was respectively 23.2 and 35.9 per cent.

In both Greek and UK industries manufacturing sector was predominant. The highest percentage share of the Greek manufacturing in the total industry occurred in 1964 and for the UK in 1973. What is noticeable is the sharp decrease of the share of UK manufacturing in total industry since 1978 which is due partly to a decline in manufacturing output, but more to the increase of output of mining and quarrying through the exploitation of petroleum and natural gas.

Table 3.1

Percentage change of output at 1974 constant factor prices.

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Min.Quar.	56	-21	63	-10	20	146	5.7	177	222	383
Manufact.	64	13	81	8	25	4	1	-7	274	18
El.Gas.Wa.	80	31	105	-4.5	58	8.5	32	-1.5	669	34
Total Ind.	64.5	12	81	5.5	27	10.5	3.5	11	293	45

source: GR__National Accounts Statistics, different years.

UK__National Income and Expenditure, different years.

Table 3.1 shows the percentage change of output of Greek and UK industries between successive benchmark years and in the period as a whole.

The output of mining and quarrying industrial sector was increasing fast in Greece, while falling in the UK, during the first two sub-periods. Since then production accelerated fast in the UK, particularly during 1978-84 due to exploitation of North Sea oil. In Greece the growth of output of mining and quarrying decelerated over the last two sub-periods. The fastest growth of mining and quarrying output was succeeded in 1968-74 in Greece and during 1978-84 in the UK. Over the entire period examined, 1963-84, production of the mining and quarrying industry grew much faster in the UK than in Greece mainly due to the North Sea oil.

Production of electricity, gas and water industry grew much faster in Greece than in the UK during all sub-periods. There has been a fall of production in the UK across the periods 1968-74 and 1978-84. Between 1963 and 1984 output of electricity, gas and water industry increased over nineteen times faster in Greece than in the UK.

Manufacturing production increased at a greater extent in Greece than in the UK during all sub-periods. Output of Greek manufacturing industry was rising rapidly over the first two sub-periods. Since then it slowed down as a consequence of different factors such as the oil crises, fall of investments and political incidents (invasion of Cyprus). Between 1963 and 1978 there has been a deceleration of growth of output in UK manufacturing industry. Furthermore, there has been a fall of UK manufacturing production during 1978-84 which was largely due to the oil crisis, UK governments high interest rates and the high value of the exchange rate. The fastest growth of manufacturing output was obtained during 1968-74 in Greece and during 1963-68 in the UK. Between 1963 and 1984 manufacturing production accelerated over fifteen times faster in Greece than in the UK.

It is obvious from table 3.1 that the period 1968-74 displayed the highest increases of output rate of the Greek industry as a whole and its components. This was mainly the result of the high rate of investment activity in the whole economy.[1] In addition, it can be said that the growth rates of output in Greek industry were more rapid until 1978 than in the period since then. In the UK, the period where positive changes of output occurred for the entire industry and its components was the 1974-78. During all the other sub-periods some negative changes appeared for different sectors of the UK industry. In the whole examined period 1963-84, the electricity, gas and water industrial sector realized the most substantial rise of the total Greek industry. As for the UK, the equivalent industry was the mining and quarrying.

Output of total industry grew at a greater extent in Greece than in the UK between 1963 and 1978. During the last sub-period total industrial output increased faster in the UK than in Greece. That was due to acceleration of output of mining and quarrying industry owed to the North Sea oil; production of manufacturing and electricity, gas and water industries in the UK fell over this period of time.

Between 1963 and 1984 total industrial output increased over six times faster in Greece than in the UK.

C. MANUFACTURING INDUSTRIES

(i) Sectoral pattern and growth of output in twenty manufacturing industries

After having examined the importance of both Greek and UK industry in the gross domestic product and having also looked at the position of the components of both industries, the focus of the analysis is turned to the heart of the matter - the manufacturing sector of both countries.

Figures 3.1 and 3.2 show that the manufacturing sector represents the largest portion of both Greek and UK industries over the entire period examined. Furthermore, equation 1.1 in chapter one showed that there has been a convergence of the shares of manufacturing sectors in GDP between the two countries.

Before looking at the patterns of growth of output in Greek and UK industry it is important to look at the structure of the two manufacturing sectors and examine whether their differences were narrowing over time.

Table 3.2 shows the percentage distribution of output in Greek and UK manufacturing industries over different sub-periods and the entire period examined, 1963-84.

During 1963-84, the four manufacturing sectors with larger

Table 3.2

PERCENTAGE DISTRIBUTION OF MANUFACTURING OUTPUT IN GREECE AND THE UK, 1963-84. (1974 CONSTANT PRICES)

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	16.5	6.2	14.6	6.4	12.0	7.7	13.9	8.1	13.0	9.8
Beverages	2.5	2.4	3.0	2.5	3.1	2.3	3.8	2.6	4.2	2.4
Tobacco	4.9	2.6	3.3	2.2	1.6	1.6	1.7	1.7	1.4	1.6
Textiles	15.2	7.4	15.8	7.1	16.5	5.9	17.6	5.0	15.8	3.0
Footw. Wear.	11.9	3.6	10.5	3.2	8.6	3.2	9.1	3.0	8.9	3.0
Wood-Cork	3.3	0.4	3.1	1.7	3.1	2.1	3.2	1.9	2.6	1.6
Furniture	2.5	2.6	3.3	1.2	2.4	1.3	2.4	1.4	1.1	1.3
Paper-Prod.	2.3	3.6	2.6	4.1	2.4	4.3	1.8	3.9	2.3	4.1
Print. Publ.	2.7	4.2	2.4	4.5	2.2	4.0	2.4	4.5	3.7	5.8
Leather	2.1	0.5	2.0	0.5	1.5	0.5	1.0	0.4	0.8	0.4
Rub. Plastics	1.8	2.3	2.2	2.9	3.1	3.1	3.3	3.2	3.2	3.7
Chemicals	4.2	8.3	5.3	7.9	6.4	8.1	6.1	9.0	6.6	10.8
Petrol-Prod.	3.0	0.8	2.8	1.1	2.8	1.1	2.1	1.5	2.6	3.5
Non Met. Min.	6.8	3.9	7.4	3.6	6.9	3.8	7.8	4.1	8.3	1.9
Basic Metals	1.7	8.2	4.1	6.8	6.7	7.8	5.2	5.7	6.7	3.5
Metal Prod.	6.1	6.2	5.6	6.1	5.8	6.3	5.2	6.3	6.3	5.4
Machinery	2.7	13.8	2.7	16.0	2.7	13.8	2.4	15.1	1.4	16.0
Electrical	3.7	8.8	4.6	9.0	4.6	9.3	3.6	9.3	3.3	10.6
Transport Eq.	5.3	13.2	3.7	12.1	6.4	12.6	5.9	12.2	6.5	10.4
Miscellaneous	0.8	1.0	1.0	1.1	1.2	1.2	1.5	1.1	1.3	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AD	76.8		72.6		58.0		66.8		71.4	

AD = sum of the absolute differences between the Greek and UK distributions.

Source: Greece__ Department of National Accounts in Athens; UK__ National Income and Expenditure, different years.

shares in the total Greek industry were firstly the textiles industries, secondly, the food industries, thirdly, the manufacture of footwear and wearing apparel, and fourthly, the manufacture of non-metallic mineral products. In 1963 benchmark year food industry was ranked first above textiles.

The four UK manufacturing sectors with the largest share ranked by size in the benchmark years 1963,1968,1974 and 1978 were as follows: manufacture of machinery and appliances, manufacture of transport equipment, manufacture of electrical machinery, apparatus, appliances and supplies, and, manufacture of chemicals. In 1984, the only changes that occurred in comparison to the previous benchmark years were that the second largest share held the manufacture of chemicals and the fourth the manufacture of transport equipment.

Furthermore, table 3.2 shows that the manufacturing sectors which were relatively more important in Greece than in the UK were textiles, manufacture of footwear and wearing apparel, and, manufacture of non-metallic mineral products. The UK manufacturing sectors which were relatively more important than in Greece were machinery and appliances, and, the manufacture of electrical machinery, apparatus, appliances and supplies.

It can be added that apart from the above differences, manufacturing sectors had also quite similar rankings in both Greece and the UK as follows: tobacco, furniture, leather, rubber and plastics, metal products, and miscellaneous.

The last line of table 3.2 shows the sum of the absolute differences between the Greek and UK industry which is the sum, ignoring the signs, of the differences in the percentage shares of the individual sectors in the two distributions. It can range in value from 200 where there is complete dissimilarity to 0 where there is complete similarity. As can be seen in table 3.2, there was some tendency for the distributions to become more similar in 1974 but then the extent of the similarity diminished slightly in 1978 and 1984.

Table 3.3 makes it possible to see the extent of structural changes in the two manufacturing sectors, in other words the extent of the change of the distribution of the twenty manufacturing industries in the total.

Table 3.3

Sum of the absolute differences between the sectoral shares of output in successive benchmark years, Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963 and 1968	15.6	11.6
1968 and 1974	17.0	9.4
1974 and 1978	12.0	8.8
1978 and 1984	13.8	19.6
1963 and 1984	31.0	35.4

source: table 3.2.

The figures in table 3.3 were estimated by calculating the absolute differences between the percentage distributions of output in any two years. The larger the figures are, the greater the structural changes were.

As can be seen in table 3.3, over the period 1963-84 the extent of structural change appears to have been not that dissimilar between both countries, UK manufacturing industry having realized a slightly larger structural change.

Looking at the individual sub-periods, it was in the periods 1963-68 and particularly 1968-74 that the most important structural changes in Greece occurred. That was mainly due to expansion of the economy as a whole, attributed to the accelerated upward trend in investment expenditure.[1] Furthermore, over these two periods, boosting effects caused largely by accelerated investments were revealed of newly established firms such as chemicals and chemical products, petroleum products, basic metals, rubber and plastics, and food.[1]

In the UK the most substantial structural changes occurred in 1978-84. Over this period, the UK manufacturing sector was badly affected by different factors such as the 1979 oil shock and depressed world trade as well as by the disinflationary policies adopted by the government in order to contain inflation.[2]

Table 3.4

REGRESSIONS ANALYSES OF THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK DISTRIBUTIONS OF MANUFACTURING OUTPUT AGAINST TIME, 1970-84. (1974 CONSTANT PRICES)

Food	$Y = 5.87 - 0.18\,T$		$R^2 = 0.56$
		(-4.07)	d = 1.91
Beverages	$Y = 0.33 + 0.10\,T$		$R^2 = 0.89$
		(10.5)	d = 2.69
Tobacco	$Y = 0.15 + 0.01\,T$		$R^2 = 0.07$
		(1.0)	d = 2.45
Textiles	$Y = 9.38 + 0.33\,T$		$R^2 = 0.58$
		(4.28)	d = 1.83
Footw. Wear.	$Y = 5.98 - 0.02\,T$		$R^2 = 0.03$
		(-0.66)	d = 1.52
Wood-Cork	$Y = 1.50 - 0.01\,T$		$R^2 = 0.01$
		(-0.38)	d = 1.65
Furniture	$Y = 1.82 - 0.13\,T$		$R^2 = 0.91$
		(-11.5)	d = 1.42
Paper-Prod.	$Y = 2.42 - 0.06\,T$		$R^2 = 0.68$
		(-5.27)	d = 1.43
Print. Publ.	$Y = 1.87 + 0.02\,T$		$R^2 = 0.13$
		(1.39)	d = 1.37
Leather	$Y = 1.26 - 0.07\,T$		$R^2 = 0.86$
		(-8.89)	d = 1.52
Rub. Plastics	$Y = 0.004 + 0.04\,T$		$R^2 = 0.35$
		(2.65)	d = 1.42
Chemicals	$Y = 1.44 + 0.17\,T$		$R^2 = 0.75$
		(6.20)	d = 1.52
Petrol-Prod.	$Y = 1.25 - 0.05\,T$		$R^2 = 0.13$
		(-1.37)	d = 2.09
Non Met. Min.	$Y = 0.76 + 0.36\,T$		$R^2 = 0.46$
		(3.33)	d = 1.43
Basic Metals	$Y = 0.38 + 0.10\,T$		$R^2 = 0.36$
		(2.68)	d = 1.64
Metal Prod.	$Y = 0.85 - 0.02\,T$		$R^2 = 0.02$
		(-0.58)	d = 1.46
Machinery	$Y = 11.5 + 0.22\,T$		$R^2 = 0.45$
		(3.24)	d = 1.83
Electrical	$Y = 3.74 + 0.24\,T$		$R^2 = 0.89$
		(10.1)	d = 1.48
Transport Eq.	$Y = 7.01 - 0.21\,T$		$R^2 = 0.56$
		(-4.08)	d = 1.42
Miscellaneous	$Y = 0.07 + 0.02\,T$		$R^2 = 0.27$
		(2.18)	d = 1.95

where Y is the absolute difference between the Greek and UK distributions of manufacturing output; T is time, representing the period 1970-84; t-statistics are in brackets and t = 1.350 at 10 % level, t = 1.771 at 5 % level and t = 2.160 at 5 % level, two-tail test. Source: as table 3.1.

The question that is raised is whether the percentage distributions of output, that were seen in table 3.2, were getting more similar between Greek and UK manufacturing industries as time was passing by. To test this, the absolute differences between Greek and UK distributions were regressed against time. There has not been any data published on output (GDP) per UK manufacturing industry at a disaggregated level for the years 1964-67 and 1969 (see also appendix one). Therefore, the regressions analyses were run for the period 1970-84 when continuous series of data exist for both manufacturing sectors at a disaggregate level and therefore do not take into consideration the difference in shares between the two industries over the period 1963-69. All regressions seen in table 3.2 have been corrected for autocorrelation as appropriate according to the method demonstrated in appendix one.

Table 3.4 shows the findings of the absolute differences between the Greek and UK distributions regressed against time, during 1970-84.

It is apparent from the coefficients in time "b" whether there was a tendency of convergence between the percentage distributions of output in both industries. The difference in proportions between Greek and UK industries was getting less as time was passing by in the following industries: food, furniture, paper, leather, petrol(t-statistic being significant only at 10% level) and transport equipment. The coefficients in time "b" were proven to be insignificant in tobacco industries, footwear and wearing, wood and cork, and metal products indicating that the differences between the shares did not change very much over the period 1970-84. These industries either had similar distributions in both countries (such as tobacco industry and metal products) or larger share in Greece than in the UK (such as footwear and wearing, wood and cork) during the period 1970-84.

The coefficients in time "b" were found positive and significant in the following industries: beverages, textiles, printing and publishing (t-statistic significant only at 10% level), rubber and plastics, chemicals, non-metallic minerals, basic metals, machinery, electrical and miscellaneous. These coefficients indicate that the differences between the percentage distributions of manufacturing output in Greece and the UK were increasing instead of diminishing over the period 1970-84. From these industries the ones with larger shares in Greece than in the UK were beverages, textiles, non-metallic minerals, basic metals and miscellaneous. The industries with larger shares in the UK than in Greece were printing and publishing, rubber and plastics, chemicals, machinery and electrical.

It would have been interesting to run the regressions seen in table 3.4 for the entire period 1963-84, so that the structural changes that occurred during 1963-69 were considered. But for the reasons that have been explained that was not feasible. Since, though, aggregate figures exist for the period 1963-84 it was possible to see the tendency of convergence between Greek and UK total manufacturing output. The value of Greek and UK manufacturing production was converted into a common currency ($ dollars) and the absolute difference between Greek and UK manufacturing output was regressed against time (period 1963-84). The equation found is 1.2 (seen in chapter one, page 10) which shows that there has been a convergence between the Greek and UK manufacturing industries in respect of output across the period 1963-84.

Table 3.5 exhibits the percentage change of output of Greek and UK manufacturing industries at an aggregate and disaggregate level over different sub-periods and the entire period examined, 1963-84. Furthermore, table 3.5 makes it easier to understand more thoroughly what caused the structural changes that were seen in table 3.3.

It is apparent from table 3.5 that Greek and UK manufacturing industries did follow different patterns of growth of output. The growth of output of total UK manufacturing decelerated since the first sub-period 1963-68 and succeeded a negative growth in the last sub-period. In Greece there has been a rapid growth in the first two sub-periods and then deceleration. The biggest increase in total Greek manufacturing industry was evident in the 1968-74 period and in the 1963-68 period for the UK.

As table 3.5 shows, in the period as a whole the output of total manufacturing industry in Greece grew over fifteen times faster than in the UK. Therefore, there was a tendency towards convergence between Greek and UK industries in respect of growth of output during 1963-84.

Table 3.5

PERCENTAGE CHANGE OF OUTPUT OF GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. (1974 CONSTANT PRICES)

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	46	16	49	29	45	9.9	-5.9	13	195	85
Beverages	102	19	82	-1.1	56	17	10	-15	536	17
Tobacco	12	-4.7	-12	-21	35	11	-18	-11	8.4	-26
Textiles	70	8.4	89	-9.6	33	-12	-9.6	-44	288	-51
Footw. Wear.	44	1.2	48	8.4	33	-2.6	-1.5	-6.3	179	0.15
Wood-Cork	54	435	78	35	29	-9.1	-16	-21	197	418
Furniture	123	-45	30	17	28	11	-53	-18	73	-42
Paper-Prod.	82	27	67	14	-4.3	-7.1	29	-2	275	31
Print. Publ.	46	24	71	-5.1	35	17	56	21	427	66
Leather	55	3.3	39	4.2	-18	-12	-21	10	39	4.4
Rub. Plastics	99	41	157	16	33	7.5	-2.1	7.7	564	89
Chemicals	104	8.1	121	11	19	15	8.7	13	482	55
Petrol-Prod.	53	48	80	15	-5	42	22	114	218	416
Non Met. Min.	80	5	67	11	43	12	6.6	-57	359	-43
Basic Metals	297	-6.2	196	24	-1.8	-24	29	-44	1393	-50
Metal Prod.	50	13	87	9.9	11	3.9	23	-20	283	32
Machinery	64	31	81	-7.3	12	14	-43	-1.7	89	36
Electrical	105	15	80	11	-1.2	4.8	-7.2	6	238	42
Transport Eq.	15	3.6	212	12	15	1.1	11	-21	361	-7.4
Miscellaneous	99	24	119	7.5	51	2.8	-13	1.2	475	38
Total	64	13	81	8	25	4	1	-7	274	18

Source: Greece__ Department of National Accounts in Athens; UK__ National Income and Expenditure, different years.

The output of Greek manufacturing industry was increasing much faster until 1973 than since and this is in accordance with other studies.[3] The strong expansion observed in manufacturing production over the period 1963-73 has been largely affected by increased investment expenditure due to expanded loans and advances to the manufacturing sector.[1,4,5] In 1973-74 the contractionary effects of higher oil prices, weak external demand and the effects of the Cyprus emergency, combined to influence a decline of manufacturing production.[6]

In the summer of 1974 the dictatorship that previously governed Greece was replaced by democracy. Over the period 1974-78 output increased but at a slower rate than before and this is in agreement with OECD's[7] study.

Table 3.5 shows that during 1978-84 Greek manufacturing output increased by only 1 per cent. In the period 1980-83 a decrease of production (by 6.5 %) was succeeded only to start increasing again since 1983 (1.9 % rise between 1983 and 1984), these findings agree with others.[8,9,10]

The analyses carried out by the Federation of Greek Industries[1] indicated that the deterioration of manufacturing production over 1980-83 was largely due to the second oil crisis as well as the increase of labour costs per unit of output and strict administrative controls. Furthermore, the decrease in the share of credit allocated to manufacturing and the rise of cost of borrowing added to the burden of industrial costs. OECD[11] pointed out that the temporary stoppage of production in some industries in 1983, caused largely by high industrial costs, was restored in

1984, mainly, as a consequence of the rise of credit to manufacturing.

As table 3.5 indicates, the group consisting of the fastest growing industries in Greece, in the period as a whole, comprised basic metal industries, manufacture of rubber and plastic products, and beverage industries.

The Greek manufacturing sectors which grew more slowly in the period 1963-84, and in some sub-periods faced a decrease, were the tobacco manufactures, manufacture of furniture and fixtures, manufacture of leather and fur products, and, manufacture of machinery and appliances.

Manufacturing sectors like the beverage industries, and basic metal industries that were among the fastest growing Greek industries in the period as a whole, realized their biggest growth in the period 1963-68. The manufacture of rubber and plastic products succeeded its biggest increase in the period 1968-74.

Table 3.5 exhibits that gross domestic product of UK manufacturing sector was increasing more or less continuously until 1973 when it reached its peak (although the growth of output decelerated in the second sub-period in relation to the first); this is in accordance with other studies.[12] Reflationary measures such as reduction of Bank rate and direct taxes stimulated both consumption and investment demand and, therefore, influenced the fast increase of UK industrial output realized during 1963-68.[13,14]

Over the second sub-period, 1968-74, the oil crisis of 1973 was a major factor in the reduction of UK manufacturing production in 1974. The immediate outcomes of this oil crisis were worsened by a confrontation with the coal miners over incomes policies which led to three-day working early in 1974.[15]

The slow recovery of output, in the UK manufacturing, between 1975 and 1979 was assisted by rapid consumption growth substantially due to strong growth of real personal disposable incomes;[12] that is discussed more in detail in chapter 4.

During the last sub-period 1978-84, the second oil crisis occurred. UK manufacturing production declined between 1979 and 1981 (by 8.5 %), this is in agreement with others.[16,17] The recession was partly induced by the oil shock and depressed world trade as well as other factors such as large pay increases and rise in sterling.[12]

There has been an increase of UK industrial production since 1981 (6.9 % rise between 1981 and 1984), this is parallel to the findings of others.[17] The pace of the recovery since 1981 has been largely associated with a fall in the savings ratio with only a slow increase in real incomes. According to the OECD[12], increases of exports and investments influenced the rapid growth of output in the UK, between 1983 and 1984.

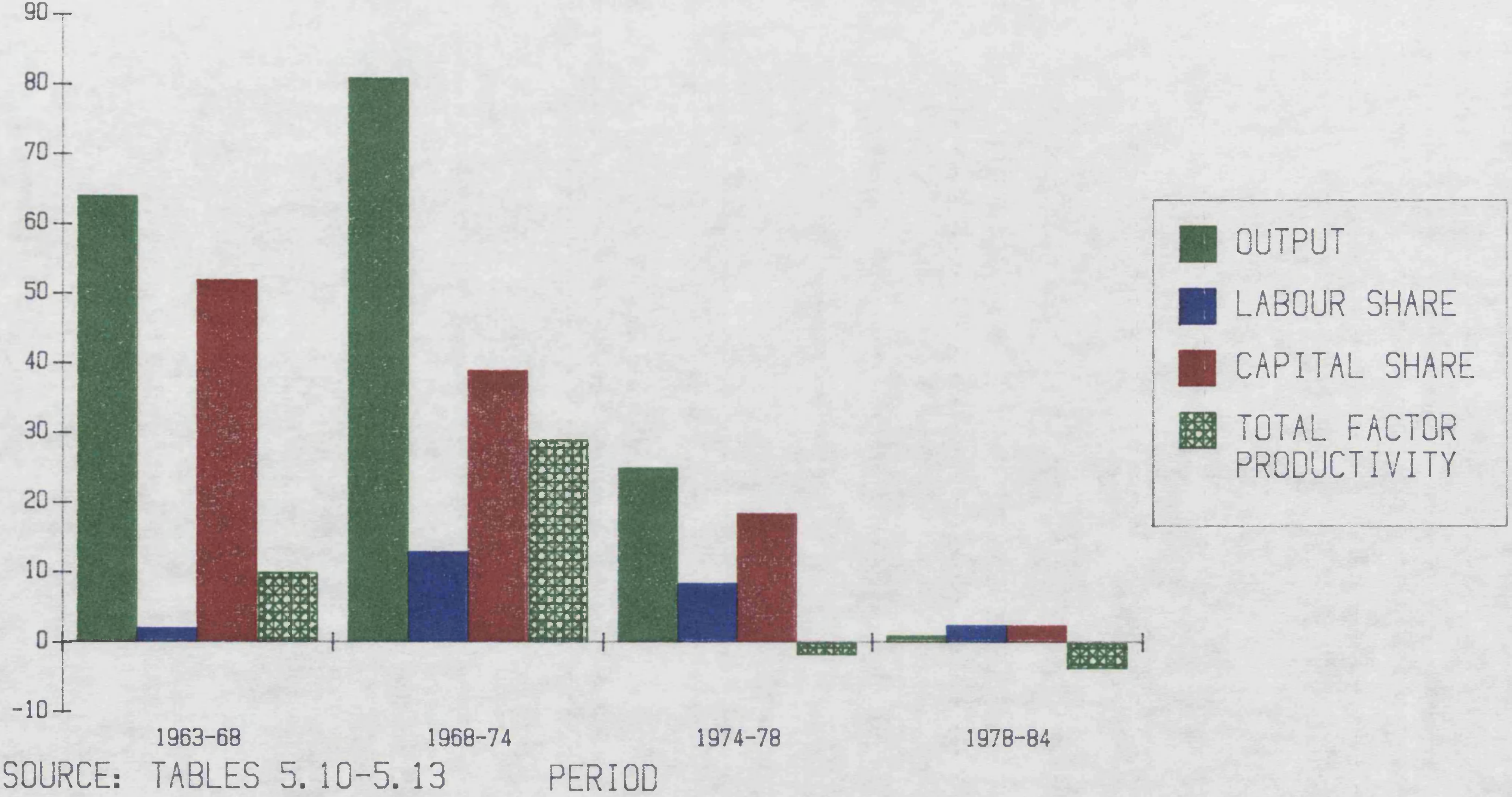
Table 3.5 shows that the UK industry that grew faster than the rest was the manufacture of wood and cork whose biggest increase occurred in the period 1963-68 and since then slowed down. The manufacture of products of petroleum and coal was the second fastest growing UK industry in the period as a whole, which in the sub-period 1978-84 realized its biggest rise.

There have been some UK manufacturing sectors that declined during the whole examined period like the tobacco manufactures, textiles, manufacture of furniture and fixtures, manufacture of non-metallic mineral products, basic metal industries, and, manufacture of transport equipment. In the period 1978-84, the output of the total UK manufacturing industry realized a negative performance.

After having examined the development of manufacturing production in both countries, the question that is raised is what were the contributors to growth of GDP in Greek and UK manufacturing industries?

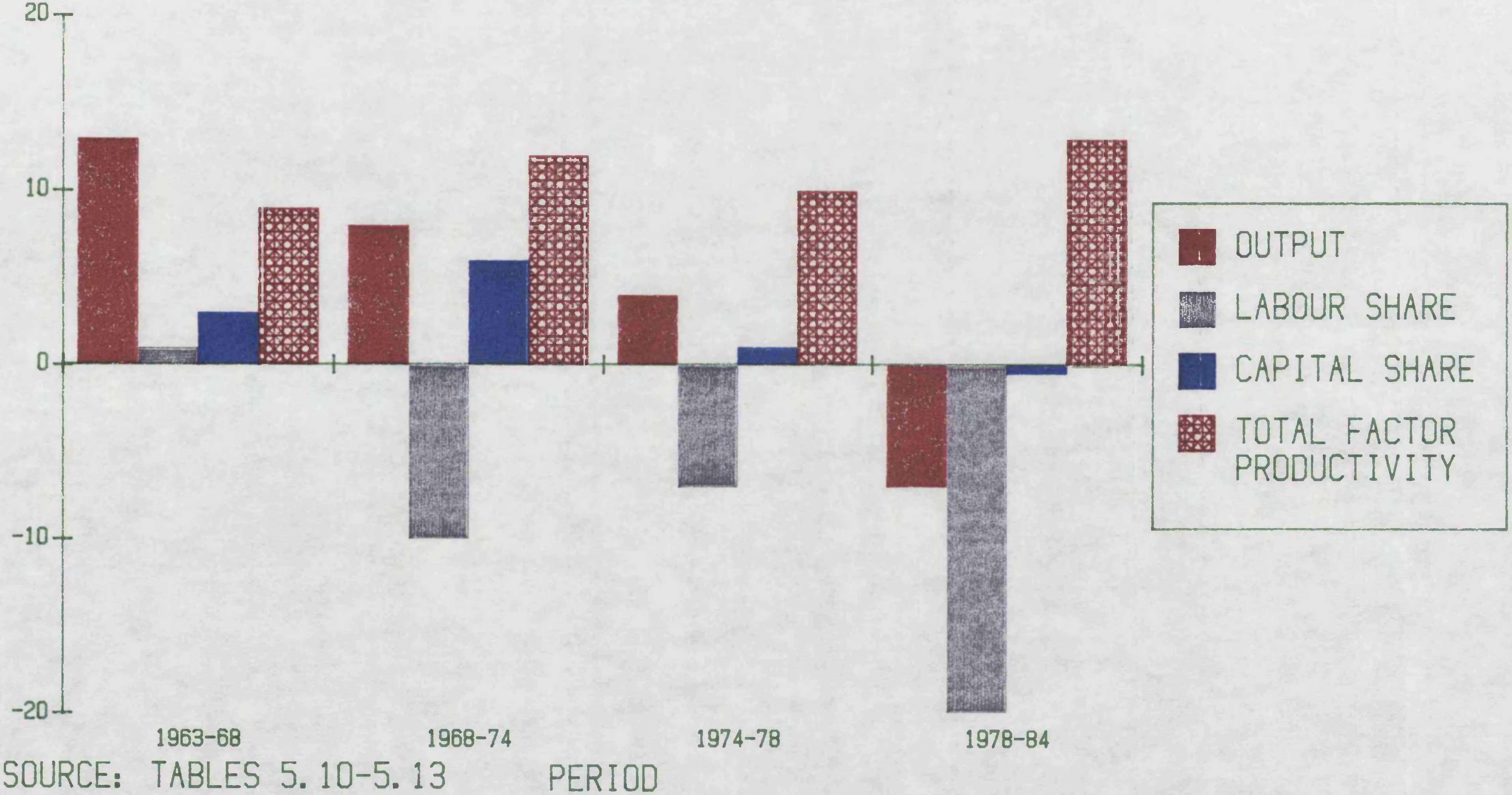
It is difficult at this stage of the analysis to examine thoroughly the contributors to growth of output of all 20 Greek and UK manufacturing industries, without first considering the development of labour, capital stock and total factor productivity that are studied in chapters 4 and 5. But figures 3.3, 3.4, 3.5 and 3.6 demonstrate the contributors to growth of GDP of Greek and UK manufacturing industries at an aggregate level over different sub-periods and the entire period examined. The analysis at a disaggregate level is carried out in chapter five (see tables 5.10-5.14).

FIGURE 3.3 CONTRIBUTIONS TO GROWTH OF OUTPUT IN GREECE (%)



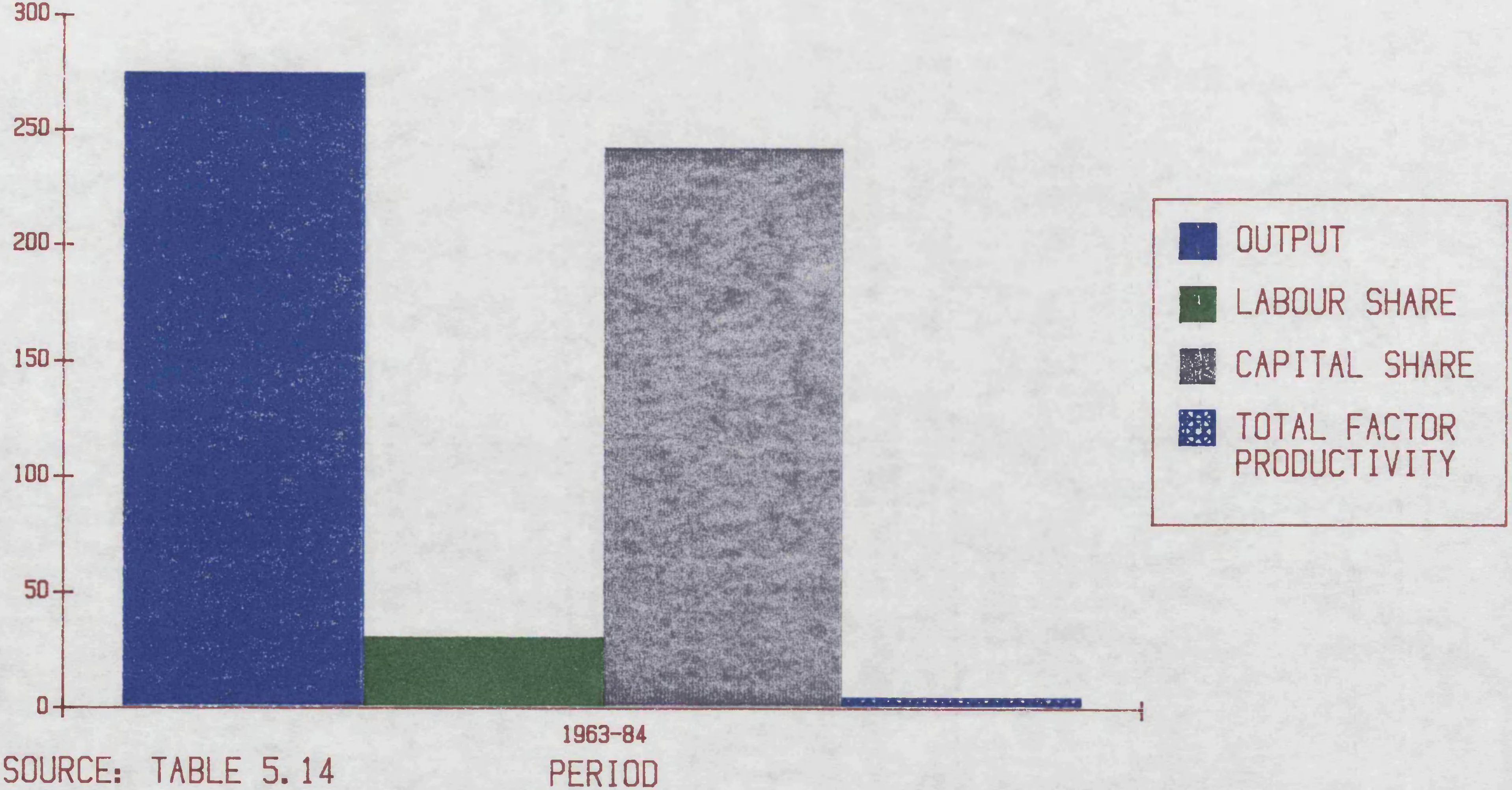
SOURCE: TABLES 5.10-5.13

FIGURE 3.4 CONTRIBUTIONS TO GROWTH OF OUTPUT IN THE UK (%)



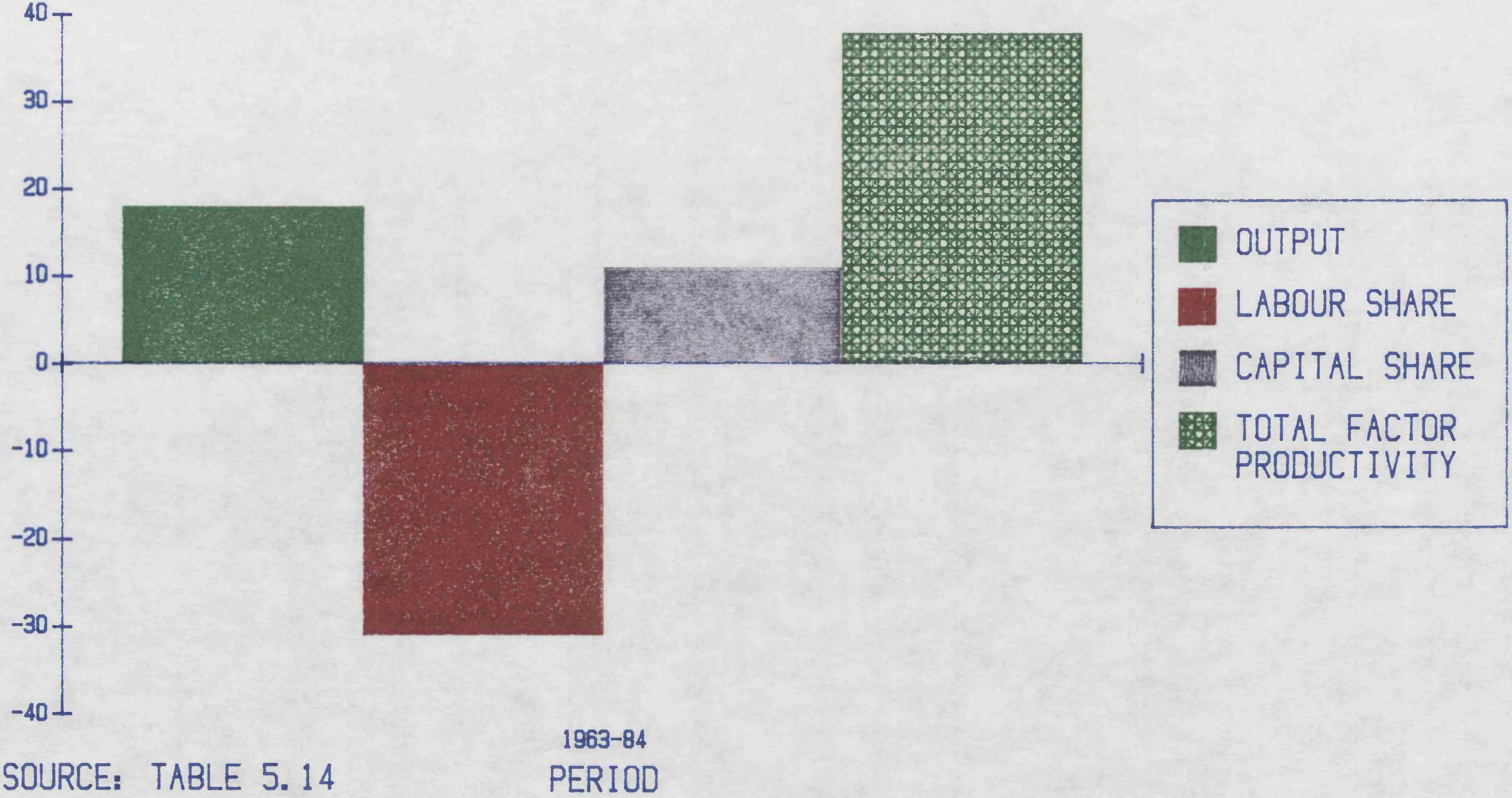
SOURCE: TABLES 5.10-5.13

FIGURE 3.5 CONTRIBUTIONS TO GROWTH OF OUTPUT IN GREECE (%)



SOURCE: TABLE 5.14

FIGURE 3.6 CONTRIBUTORS TO GROWTH OF OUTPUT IN THE UK (%)



SOURCE: TABLE 5.14

It has already been shown that there has been a convergence between Greek and UK manufacturing sectors in terms of output during 1963-84. But the above figures show that the contributors to growth of manufacturing production were different in both countries.

During different sub-periods and the entire period examined, it was the growth of capital share that contributed mostly to the growth of GDP of Greek manufacturing. Over the same periods of time, the main contributor to growth of GDP in UK manufacturing was total factor productivity which is that portion of output growth that is not accounted for by increases in inputs of labour and capital.

Table 3.6 shows the average annual rate of growth of output of manufacturing industries in both countries. In other words, it takes into consideration the increase or decrease of output in a continuous series of years.

There has not been any data published on output (GDP) per UK manufacturing industry at a disaggregated level for the years 1964-67 and 1969 (see also appendix one). Therefore, the average annual rates of growth of output of UK manufacturing industries could only be estimated for the period 1970-84. Since the data is available for the Greek industry, the average annual rates of growth have been calculated for the entire period, 1963-84, and for comparative reasons for the period 1970-84 as well.

As table 3.6 indicates, the group consisting of the three-fastest growing industries in Greece, in the period as a whole,

Table 3.6

Average annual rates of growth of output of Greek and UK manufacturing industries. Per cent.

	Greece		United Kingdom
	1963-84	1970-84	1970-84
Food	5.5	3.8	3.0
Beverages	9.8	6.2	-0.5
Tobacco	1.0	1.0	-1.5
Textiles	7.0	5.3	-4.7
Footw. Wear.	5.3	3.8	-0.1
Wood-Cork	6.3	3.4	-0.8
Furniture	3.7	-1.9	1.3
Paper - Prod.	7.3	6.9	-0.03
Print.Publ.	8.6	6.2	2.1
Leather-Fur	3.8	-0.2	0.5
Rub.Plastics	15.0	5.4	1.7
Chemicals	9.6	4.8	2.4
Petrol- Prod.	11.0	12.0	14.0
Non Met. Min.	7.9	4.9	-2.5
Basic Metals	18.0	5.3	-4.6
Metal Prod.	7.0	5.3	-1.2
Machinery	3.6	0.1	0.3
Electrical	6.7	2.2	1.3
Transport Eq.	8.3	5.9	-0.6
Miscellaneous	12.0	5.6	2.1
Total	6.7	4.2	0.04

source: based on the same sources of data as table 3.2

comprised basic metal industries, manufacture of rubber and plastic products, and finally, miscellaneous manufacturing industries. The average annual rate of growth of output of the whole Greek manufacturing sector in the period 1963-84 was 6.7 per cent.

Turning to UK data, the fastest-growing industries in the period 1970-84 were the manufacture of products of petroleum and coal, and food industries. There have been industries in the UK that during 1970-84 experienced negative average annual rates of growth such as beverage industries, tobacco manufactures, textiles, manufacture of footwear and wearing apparel, manufacture of wood and cork, manufacture of paper and paper products, manufacture of non-metallic mineral products, basic metal industries, manufacture of metal products, and manufacture of transport equipment.

In the 1970-84 period, total UK manufacturing industry experienced an average annual rate of growth of 0.04 per cent and Greek industry of 4.2 per cent and here again is shown a tendency of convergence between the patterns of growth in Greek and UK manufacturing industries in respect of output. In the 1970-84 period, the manufacturing sectors in both countries that experienced a fast increase were the food industries and manufacture of products of petroleum and coal.

Table 3.7

Correlation coefficients between the rates of growth of output of Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	-0.14 (ns)
1968-74	0.33 (ns)
1974-78	0.20 (ns)
1978-84	0.17 (ns)
1963-84	-0.16 (ns)

ns = not significant at the 5 % level

source: table 3.5.

The basic similarity between the two countries pattern of industrial growth emerges clearly from the coefficients of correlation given in table 3.7. All the correlations were proven to be insignificant indicating no similarity between the patterns of growth of output of the two manufacturing industries during all sub-periods and the entire period examined. This is mainly due to the fact that Greek manufacturing sector was increasing much faster than its counterpart in the UK and hence there was a tendency of convergence between the patterns of growth of output of the two industries during 1963-84.

(ii) Relationship between stability and growth of twenty manufacturing sectors.

Following NEDO's model this section will study any possible association between stability and growth in Greek and UK industries. The relevance of the analysis of stability in this dissertation is to examine how stable the twenty Greek and UK industries are and if there is any possible relationship between their growth of production and stability. Does the evidence support that rapidly growing industries have also been more stable industries?

There are different measures of instability such as: (1) the average deviation, (2) the variance, (3) the standard deviation, (4) the coefficient of variation and (5) the range.

Wilson[18,19] used the last three measures of instability in order to examine whether instability hampers growth and whether the proposition that the pace of UK economic advance has been greatly reduced by its unsteadiness, is true.

All the above measures of dispersion will be followed except the variance. According to Salvatore[20]:

"The advantage of the standard deviation over the variance is that the standard deviation is expressed in the same units as the data rather than in 'the width squared' which is how the variance is expressed".

The standard deviation is by far the most widely used measure of absolute dispersion which is to be contrasted with the coefficient of variation which measures the relative dispersion in the data.

Furthermore, it is worth mentioning seven different instability indices that have also been used in the literature. In general, these indices do measure deviations from some sort of trend but the choice of trend is almost always arbitrary and determines the definition of "instability" itself. Helleiner[21] used the "average annual percentage rate of change index" which is:

$$I_1 = (\sum_{t=2}^{n} X_t) / n\text{-}1$$

where $X_t = 100 [\mid V_t - V_{t-1} \mid / \max(V_t, V_{t-1})]$;

V_t = value of the variable in year t

and n = number of observations

Helleiner applied also the "moving average deviation index" which is :

$$I_2 = \sum_{t=3}^{n-2} Y_t / n\text{-}4$$

where $Y_t = 100 [\mid V_t - A_t \mid / A_t]$

and $A_t = (V_{t-2} + V_{t-1} + V_t + V_{t+1} + V_{t+2}) / 5$

Massell22 exercised the "normalised standard error index" which is :

$$I_3 = (\sqrt{\Sigma (u_t)^2 / n}) / \bar{V}$$

where ut is the deviation of actual values from their estimated

linear time trend values; $u_t = V_t - (a_o + a_1)t$

and $\bar{V} = \Sigma V_t / n$

Massell utilized as well the "average annual percentage rate of change index", trend corrected :

$$I_4 = \sum_{1}^{n-1} w_t / n\text{-}1$$

where $w_t = (\mid u_t - u_{t-1} \mid) / \max [V_t, V_{t-1}]$,

and u_t is defined as for I_3 above.

Coppock[23,24] employed as a measure of instability the "average percentage deviation from trend index" :

$$I_5 = \sum_{i}^{n} 100 [\mid V_t - (a_o + a_1 t) \mid / a_o + a_1 t] / n$$

as well as the "Coppock" or Log Variance Index :

$$I_6 = 100 [\text{Antilog} (\sqrt{Z \log}) - 1]$$

$$\text{where } Z \log = \sum_{2}^{n} (\log [V_t / V_{t-1}] - m)2 / n-1$$

$$\text{and } m = \sum_{2}^{n} (\log V_t - \log V_{t-1}) / n-1$$

Finally, Massell[25] followed the "standard deviation of residuals index" :

$$I_7 = \sqrt{\Sigma} (\hat{u}_t - \bar{u})2 / n$$

where $\log_e V_t = a^o + a_1 t$ so $\hat{u}_t = \log Y_e V_t - a_o - a_1 t$

All the measures correct for trend. The first two do not make any explicit trend assumption although the second is based on a moving average. The best instability measure will be a generalised measure of dispersion from trend. In other words, as Horesh and Lawson26 comment, the complex variations in value picked up by I_4 and I_5 may be completely false. Therefore, as Horesh and Lawson said, both I_3 and I_7 , based on the standard error of the estimated residuals, are probably the best available types of index. Here estimate I_3 is calculated that can be seen in tables 3.8 and 3.9.

TABLE 3.8

MEASURES OF INSTABILITY AND PERCENTAGE DISTRIBUTION OF OUTPUT IN MANUFACTURING INDUSTRIES, GREECE, 1963-84.

	Percentage Distribution 1963		Percentage Distribution 1984		Standard Dev. 1963-84		Coef. of Var. 1963-84		Range 1963-84		Average Dev. 1963-84		Norm.St.Er.In. 1963-84	
Food	16.5	(1)	13.0	(2)	0.056	(1)	1.01	(1)	0.18	(1)	0.048	(1)	0.083	(1)
Beverages	2.5	(13)	4.2	(9)	0.117	(9)	1.20	(4)	0.50	(11)	0.080	(8)	0.091	(3)
Tobacco	4.9	(7)	1.4	(15)	0.0997	(7)	11.64	(20)	0.40	(7)	0.077	(6)	0.113	(9)
Textiles	15.2	(2)	15.8	(1)	0.096	(4)	1.36	(5)	0.35	(4)	0.079	(7)	0.17	(11)
Footw. Wear.	11.9	(3)	8.9	(3)	0.078	(2)	1.49	(7)	0.29	(3)	0.064	(2)	0.084	(2)
Wood-Cork	3.3	(10)	2.6	(13)	0.146	(13)	2.32	(13)	0.52	(12)	0.114	(14)	0.183	(13)
Furniture	2.5	(13)	1.1	(17)	0.15	(14)	4.10	(18)	0.55	(13)	0.126	(15)	0.27	(19)
Paper-Prod.	2.3	(14)	2.3	(14)	0.12	(10)	1.72	(10)	0.48	(10)	0.102	(11)	0.107	(7)
Print. Publ.	2.7	(12)	3.7	(10)	0.0995	(6)	1.15	(3)	0.44	(8)	0.067	(4)	0.095	(5)
Leather	2.1	(15)	0.8	(18)	0.23	(16)	6.13	(19)	1.20	(16)	0.154	(16)	0.31	(20)
Rub. Plastics	1.8	(16)	3.2	(12)	0.50	(20)	3.26	(16)	2.54	(20)	0.232	(18)	0.17	(12)
Chemicals	4.2	(8)	6.6	(6)	0.152	(15)	1.58	(8)	0.65	(15)	0.110	(13)	0.112	(8)
Petrol-Prod.	3.0	(11)	2.6	(13)	0.46	(19)	3.96	(17)	2.32	(19)	0.255	(19)	0.19	(15)
Non Met. Min.	6.8	(4)	8.3	(4)	0.08	(3)	1.02	(2)	0.27	(2)	0.065	(3)	0.101	(6)
Basic Metals	1.7	(17)	6.7	(5)	0.34	(18)	1.92	(11)	1.39	(17)	0.256	(20)	0.242	(17)
Metal Prod.	6.1	(5)	6.3	(8)	0.0988	(5)	1.40	(6)	0.36	(5)	0.076	(5)	0.09	(4)
Machinery	2.7	(12)	1.4	(15)	0.10	(8)	2.80	(15)	0.38	(6)	0.0801	(9)	0.25	(18)
Electrical	3.7	(9)	3.3	(11)	0.13	(11)	1.94	(12)	0.46	(9)	0.105	(12)	0.18	(14)
Transport Eq.	5.3	(6)	6.5	(7)	0.14	(12)	1.67	(9)	0.64	(14)	0.091	(10)	0.12	(10)
Miscellaneous	0.8	(18)	1.3	(16)	0.28	(17)	2.41	(14)	1.48	(18)	0.175	(17)	0.21	(16)
Total	100.0		100.0		0.06		0.95		0.22		0.053		0.1	

where the figures in the parentheses represent the rankings.

Source: based on the same sources of data as table 3.2.

In order to estimate the instability of the twenty manufacturing sectors, series of data on annual rates of growth are needed. For the reasons that have been explained before the instability measures for the UK can only be estimated for the years 1970 until 1984.

Table 3.8 shows the percentage distributions of output in the Greek manufacturing industry in 1963 and 1984 that represent the beginning and the end of the period examined. This table exhibits also the standard deviation, coefficient of variation, range, average deviation, and normalised standard error index of the annual rates growth of output.

The most stable Greek industry is the one with the smallest measure of instability and is ranked 1. The least stable is ranked 20, there being twenty manufacturing industries under examination. The industry with the largest share of output in total Greek manufacturing is ranked 1 and the industry with the smallest share is ranked 18, as there are some industries that have the same rankings as others.

It is obvious from the picture that is given in table 3.8 that many of the industries that had a large portion of output in total manufacturing were also proved stable in the period 1963-84. Hence, there is a link between the size of a sector, as measured by its share in manufacturing output, and stability.

The most stable Greek manufacturing sector was the food industry which was also the largest in 1963 and the second largest in 1984. Furthermore, some other industries that were among the largest and most stable over the entire period examined were: manufacture of footwear and wearing apparel, textiles, manufacture of non-metallic mineral products, and manufacture of metal products.

Among the smallest and most unstable Greek industries, during 1963-84, were the manufacture of rubber and plastic products, manufacture of products of petroleum and coal, basic metal industries, and miscellaneous.

Comparing the figures of tables 3.8 and 3.6 can be seen that some industries that were among the most stable and largest Greek industries tended not to grow as fast as the smallest and least stable manufacturing sectors. For example, the food industry that was the largest and most stable industry realized an average annual rate of growth of 5.5 % , between 1963 and 1984, while basic metals that was among the least stable industries accelerated by 18 %.

It must not, of course, be inferred that there is a negative association between stability and growth for the Greek manufacturing industry. Economicos Tachedromos[27] argues that accelerated investment influenced the growth of output of some small (measured by percentage distribution in the total) and less stable Greek manufacturing sectors such as rubber and plastics, chemicals, petrol and products, and, basic metals.

TABLE 3.9

MEASURES OF INSTABILITY AND PERCENTAGE DISTRIBUTION OF OUTPUT IN MANUFACTURING INDUSTRIES, UK, 1970-84.

	Percentage Distribution 1970		Percentage Distribution 1984		Standard Dev. 1970-84		Coef. of Var. 1970-84		Range 1970-84		Average Dev. 1970-84		Norm.St.Er.In. 1970-84	
Food	6.6	(6)	9.8	(5)	0.06	(3)	1.97	(1)	0.184	(2)	0.048	(5)	0.061	(10)
Beverages	2.7	(14)	2.4	(12)	0.078	(12)	-15.23	(16)	0.27	(8)	0.064	(12)	0.0622	(12)
Tobacco	2.1	(15)	1.6	(14)	0.082	(13)	-5.56	(10)	0.29	(10)	0.058	(10)	0.091	(17)
Textiles	6.5	(7)	3.0	(11)	0.12	(16)	-2.52	(3)	0.53	(15)	0.081	(15)	0.082	(16)
Footw. Wear.	3.1	(12)	3.0	(11)	0.061	(4)	-59.86	(19)	0.23	(4)	0.047	(4)	0.048	(5)
Wood-Cork	1.8	(16)	1.6	(14)	0.071	(7)	-8.36	(13)	0.25	(6)	0.060	(11)	0.058	(9)
Furniture	1.1	(17)	1.3	(15)	0.089	(14)	6.92	(12)	0.32	(11)	0.073	(14)	0.081	(15)
Paper-Prod.	4.1	(10)	4.1	(8)	0.062	(5)	-185.82	(20)	0.245	(5)	0.046	(3)	0.038	(3)
Print. Publ.	4.4	(9)	5.8	(6)	0.064	(6)	3.00	(5)	0.25	(6)	0.049	(6)	0.0527	(7)
Leather	0.5	(19)	0.4	(17)	0.116	(15)	22.06	(17)	0.37	(13)	0.093	(16)	0.07	(13)
Rub. Plastics	3.0	(13)	3.7	(9)	0.075	(9)	4.48	(8)	0.34	(12)	0.050	(7)	0.053	(8)
Chemicals	8.0	(4)	10.8	(2)	0.076	(10)	3.14	(6)	0.23	(4)	0.065	(13)	0.075	(14)
Petrol-Prod.	1.0	(18)	3.5	(10)	0.33	(20)	2.42	(2)	1.11	(18)	0.262	(20)	0.17	(20)
Non Met. Min.	3.6	(11)	1.9	(13)	0.17	(18)	-6.67	(11)	0.65	(16)	0.111	(19)	0.15	(19)
Basic Metals	7.6	(5)	3.5	(10)	0.13	(17)	-2.86	(4)	0.52	(14)	0.094	(17)	0.0	(1)
Metal Prod.	6.4	(8)	5.4	(7)	0.055	(2)	-4.71	(9)	0.229	(3)	0.039	(2)	0.046	(4)
Machinery	15.8	(1)	16.0	(1)	0.0713	(8)	25.50	(18)	0.26	(7)	0.051	(8)	0.052	(6)
Electrical	8.9	(3)	10.6	(3)	0.048	(1)	3.79	(7)	0.144	(1)	0.038	(1)	0.036	(2)
Transport Eq.	11.7	(2)	10.4	(4)	0.077	(11)	-12.25	(15)	0.28	(9)	0.057	(9)	0.0621	(11)
Miscellaneous	1.1	(17)	1.2	(16)	0.2	(19)	9.59	(14)	0.89	(17)	0.104	(18)	0.11	(18)
Total	100.0		100.0		0.044		124.17		0.147		0.034		0.032	

where the figures in the parentheses represent the rankings.

Source: based on the same sources of data as table 3.2.

In table 3.9 can be seen the equivalent data that was shown in table 3.8, but this time for the United Kingdom for the period 1970-84.

It is apparent from table 3.9 that there is not a strong link between the size of a sector, measured by its share in manufacturing output, and stability in the UK; therefore, Greek and UK industries did not experience similar patterns of development, since in Greece there was found a strong association between the size of a sector and stability. But still there is a tendency for the most stable manufacturing industries in the UK to have larger percentage distribution in the total manufacturing industry.

Table 3.8 indicates that the coefficient of variation figures give in some cases different results from the other measures of instability. The coefficient of variation, though, is a relative measure of dispersion and is not always reliable as it tends to exaggerate the instability of slowly growing industries.[28]

Among the most stable and largest UK industries in the period 1970-84 (displayed in table 3.9) were the manufacture of electrical supplies, food industries, and manufacture of metal products.

On the other hand, the group of industries that were among the least stable and had small percentage distribution in the total consisted of the manufacture of products of petroleum and coal, manufacture of non-metallic mineral products, and miscellaneous manufacturing industries.

It cannot be argued here (as for Greece in some cases) that small and less stable industries tended to grow faster than the rest manufacturing sectors. But the situation was different in the case of petrol and products industry which occupying less than 4% of the total manufacturing realized the highest annual rate of growth during 1970-84 (table 3.6).

Putting tables 3.8 and 3.9 together, the manufacturing sectors that were among the most stable in both countries were the food industries, manufacture of footwear and wearing apparel, and manufacture of metal products. Among the least stable industries were the manufacture of products of petroleum and coal, and miscellaneous manufacturing industries.

There were though, some fundamental differences between the rankings of stability of the two industries. The manufacture of non-metallic mineral products was by far more stable in the Greek industry than in the UK. On the other hand, the manufacture of electrical supplies was by far more stable in UK industry than in the Greek.

Table 3.10

Correlation coefficients between the annual rates of growth of output and different measures of stability in Greece, for the years 1963-84, and in the UK, for the years 1970-84.

Correlation coefficients between the rates of growth of output and:	Greece 1963-84	UK 1970-84
standard deviation	0.68 (s)	0.57 (s)
coefficient of variation	-0.40 (s)	0.07 (ns)
range	0.65 (s)	0.45 (s)
average deviation	0.69 (s)	0.65 (s)
normalised standard error index	0.05 (ns)	0.52 (s)

s = significant at the 5 per cent level.

ns = not significant at the 5 per cent level.

source: tables 3.6. 3.8 and 3.9.

Table 3.10 shows that most measures of stability indicate a strong relationship between annual growth rates of output and stability for Greece and the UK. The association was stronger in Greece.

D. CONCLUSIONS

Total industry that consisted of Mining and Quarrying, Manufacturing, and Electricity, Gas and Water had a much larger share in GDP in the UK than in Greece at the starting point of the analysis in 1963. Since then their shares were getting closer and finally in 1984 the share of the Greek and UK industries in the GDP represented respectively 23.2 and 35.8 per cent. In Greek and UK industries, the manufacturing sector was predominant.

The main focus of this chapter is to examine the first hypothesis of this thesis that there was a convergence between Greek and UK manufacturing industries in relation to output, during 1963-84.

The distributions of twenty Greek and UK industries in total manufacturing output were studied over time. The absolute differences between the Greek and UK distributions in manufacturing output were regressed against time. The findings supported the convergence hypothesis in terms of output during 1963-84.

It was demonstrated that Greek and UK industries did not follow similar patterns of growth of output. The growth of production of total UK manufacturing industry decelerated since the first sub-period 1963-68 and in the last sub-period succeeded a negative growth. In Greece there has been a rapid growth of total manufacturing output across the first two sub-periods and since then deceleration. The fastest rate of growth of output of total Greek manufacturing industry occurred during 1968-74 and across the period 1963-68 for the UK.

Greek manufacturing production increased over fifteen times faster than in the UK over the entire examined period, 1963-84. Therefore, Greek industry was catching up with the UK in respect of growth of output.

Then, the contributors to growth of production were examined in both countries. During 1963-84 the main contributor to growth of gross domestic product of total Greek manufacturing industry was the growth of capital share on output while in the UK it was the growth of total factor productivity.

There was evidence to support the fact that there is a link between the size of a sector as measured by its share in manufacturing output and stability in Greece. In the UK this link was not that strong, but still there was a tendency for the most stable manufacturing industries to hold the largest shares in the total. Hence, there was found a stronger association between the size of a sector and stability in Greece than in the UK.

There was a positive association between annual growth rates of output and stability. This association proved to be much stronger for Greece than for the UK. In some cases though, there were some small (measured by their distribution in the total) and less stable industries in the Greek manufacturing that grew faster than the larger and more stable industries influenced by factors such as increased investment. In UK manufacturing that was the case with the petrol and products industry.

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CHAPTER FOUR

CAPITAL AND LABOUR: THEIR GROWTH, DISTRIBUTION AND PRODUCTIVITY

A. INTRODUCTION

This chapter examines and compares the Greek and UK manufacturing industries in terms of capital and labour inputs, capital intensity, capital and labour productivity, as well as labour costs during the period 1963-84. The main purpose of this chapter is to test the second hypothesis which proposes that a convergence of Greek and UK industries in respect of these factors has been taking place. Findings that Greek industry has grown faster than the UK in terms of the above factors are expected; supporting the hypothesis. Furthermore, the absolute differences between Greek and UK industries in respect of capital and labour, capital intensity, capital and labour productivity and labour costs are tested for narrowing disparities.

Capital is defined as gross fixed capital stock, that is, land, buildings, machinery and equipment, and other fixed assets.

There is mainly one source of information concerning the capital stock for the Greek manufacturing. An attempt was made to estimate capital stock by the perpetual inventory method and details of this can be found in appendix one. The results were not used for the reasons explained in the appendix.

The data on gross fixed capital stock at current prices for the Greek manufacturing industry was taken from the FGI[1]. Then the figures were modified into 1974 constant prices using as a deflator the "price index of manufacturing products" taken for the years 1963-69 from the "National Accounts of Greece", different editions, and for the years 1970-84 from the FGI[1].

The data sets on capital stock at current prices for the UK manufacturing were obtained from the Central Statistical Office and were adjusted into 1974 constant prices using as a deflator the "gross domestic fixed capital formation" extracted from the "CSO, UK National Accounts", ed. 1985.

Labour input is defined as the annual average of number of persons employed in Greek manufacturing industry. For UK manufacturing industry the number of persons employed has been used, at mid-June each year.

Labour costs are interpreted as wages and salaries per unit of labour. The data on labour costs for Greece was taken from the "Annual Industrial Survey", different years, and FGI[1] and was modified into 1974 constant prices using as a deflator the "index of wages and salaries for manufacturing", extracted from the FGI (see also appendix one). The data sets on labour costs for the UK were obtained from the "Business Monitor", different years, and were turned to 1974 constant prices using as a deflator the "income from employment" from the "CSO, UK National Accounts", ed. 1985.

Labour remuneration per unit of output is specified as wages and salaries per unit of labour divided by output.

The structure of this chapter is as follows:

B. The pattern and growth of capital and labour inputs, and capital intensity

(i) capital inputs

- *capital stock and output*

(ii) labour inputs

- *labour inputs and output*

(iii) capital and labour inputs after excluding the influence of output

(iv) capital intensity

C. Capital - labour productivity and labour costs

(i) capital productivity

- *capital productivity and output*

(ii) labour productivity

- *allocation of employment and productivity*
- *labour productivity and output*

(iii) labour costs

D. Conclusions

E. References

Table 4.1

PERCENTAGE DISTRIBUTION OF CAPITAL STOCK IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. (1974 PRICES).

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	15.6	8	8.7	8	9	8.3	10.3	8.3	9.8	8.8
Beverages	5.2	2.6	3.9	2.9	3.8	3.8	3.6	3.9	4	3.8
Tobacco	1.6	0.4	1.6	0.5	0.9	0.5	0.9	0.5	0.9	0.8
Textiles	17.2	7.5	11.8	6.9	14	6.1	15.9	5.9	10.9	5.1
Footw. Wear.	0.4	1.9	0.4	1.7	0.9	1.7	1.3	1.6	1.4	1.5
Wood-Cork	0.4	0.2	1	0.2	1.8	0.2	1.6	0.2	1.5	0.2
Furniture	0.3	1.2	0.3	1.3	0.5	1.6	0.6	1.6	0.5	1.6
Paper-Prod.	5.2	3.4	5.1	3.3	3.8	3.4	4.5	3.2	3.4	2.9
Print. Publ.	0.4	3.6	0.8	3.6	1	3.3	1	3.5	1.2	4.3
Leather	0.6	0.4	0.4	0.3	0.2	0.4	0.3	0.3	0.3	0.1
Rub. Plastics	2.3	1.6	2.5	2.9	2.6	3.4	3.2	3.7	3	3.7
Chemicals	17.6	13.5	18.7	14.6	12.2	15.5	9.8	15.8	10	16
Petrol-Prod.	0.4	1.8	2.9	2.7	7.8	1.3	4.4	2.1	4.9	2
Non Met. Min.	11.3	3	10.8	2.7	12.3	4.3	13.1	3.5	13.7	3.6
Basic Metals	8.9	12.6	18.4	11.4	12.1	11.6	9.4	12.2	12.1	11.1
Metal Prod.	4.0	6.1	5.4	5.8	6.1	5.5	6.4	5.3	7.4	5.2
Machinery	0.7	10.4	0.9	10.5	0.9	10.0	1.2	10.1	0.9	10.8
Electrical	2.3	5.9	2.3	6	3.9	6.2	4.1	6.2	2.6	6.3
Transport Eq.	5.3	14.6	3.9	13.5	5.9	11.7	7.9	10.9	11	11.1
Miscellaneous	0.3	1.3	0.2	1.2	0.3	1.2	0.5	1.2	0.5	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Greece__ "The State of Greek Industry", different years; Federation of Greek Industrialists.
UK__ Central Statistical Office.

B. THE PATTERN AND GROWTH OF CAPITAL AND LABOUR INPUTS, AND CAPITAL INTENSITY.

(i) CAPITAL INPUTS

This section will study part of the second hypothesis and will examine convergence of the Greek and UK industries in relation to capital stock.

At first, the structure of the two industries in terms of capital stock will be considered. Table 4.1 shows the capital stock distribution in the two manufacturing sectors in the period 1963-84. It is apparent from table 4.1 that the structure of the two industries in respect of capital stock was not that dissimilar.

The manufacturing industries that had the largest share in the total for Greece were the food, textiles, chemicals and allied products, non-metallic mineral products, and basic metal industries. In 1984 the transport equipment industry held the third largest share in the total Greek manufacturing sector.

In the UK industry, the industries with the largest share were food, chemicals and allied products, basic metals, machinery and appliances, and transport equipment.

The manufacturing industries with the greater portion in the total for both Greece and the UK were food, chemicals and allied, basic metals, and in addition, in 1984 transport equipment.

Table 4.2

THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK DISTRIBUTIONS OF CAPITAL STOCK REGRESSED AGAINST TIME, 1963-84. (1974 CONSTANT PRICES).

Food	Y = 3.03 - 0.12 T		R^2 = 0.25
		(-2.56)	d = 1.45
Beverages	Y = 1.23 - 0.04 T		R^2 = 0.17
		(-1.99)	d = 1.63
Tobacco	Y = 0.37 - 0.05 T		R^2 = 0.57
		(-5.10)	d = 1.46
Textiles	Y = 0.83 + 0.09 T		R^2 = 0.01
		(0.51)	d = 1.63
Footw. Wear.	Y = 0.60 - 0.08 T		R^2 = 0.80
		(-9.05)	d = 1.66
Wood-Cork	Y = 0.22 + 0.02 T		R^2 = 0.05
		(1.06)	d = 2.38
Furniture	Y = 0.96 + 0.01 T		R^2 = 0.24
		(2.48)	d = 1.45
Paper-Prod.	Y = 1.56 - 0.05 T		R^2 = 0.45
		(-4.01)	d = 1.52
Print. Publ.	Y = 1.31 + 0.006T		R^2 = 0.01
		(0.46)	d = 1.77
Leather	Y = 0.09 + 0.004T		R^2 = 0.09
		(1.46)	d = 1.45
Rub. Plastics	Y = 0.44 + 0.01 T		R^2 = 0.34
		(3.18)	d = 1.47
Chemicals	Y = 0.90 + 0.09 T		R^2 = 0.01
		(0.44)	d = 1.44
Petrol-Prod.	Y = 0.31 + 0.08 T		R^2 = 0.02
		(0.61)	d = 1.45
Non Met. Min.	Y = 6.70 + 0.19 T		R^2 = 0.69
		(6.74)	d = 1.54
Basic Metals	Y = 1.98 - 0.28 T		R^2 = 0.15
		(-1.87)	d = 1.56
Metal Prod.	Y = 0.14 + 0.07 T		R^2 = 0.06
		(1.15)	d = 1.85
Machinery	Y = 0.34 + 0.09 T		R^2 = 0.05
		(1.02)	d = 1.66
Electrical	Y = -0.08 + 0.11 T		R^2 = 0.01
		(0.39)	d = 1.77
Transport Eq.	Y = 4.75 - 0.54 T		R^2 = 0.93
		(-16.9)	d = 1.45
Miscellaneous	Y = 0.55 - 0.02 T		R^2 = 0.70
		(-6.77)	d = 2.12

where Y is the absolute difference between the Greek and UK distributions in terms of capital stock; T is time, representing the period 1963-84; t-statistics are in brackets and t = 1.325 at 10 % level, t = 1.725 at 5 % level and t = 2.086 at 5 % level, a two-tai test. Source: as table 4.1.

To test whether the percentage distributions of capital stock in Greek and UK manufacturing industries were getting closer with time, their absolute differences were regressed against time, during the period 1963-84. The equations found are demonstrated in table 4.2 and are free of autocorrelation.

The coefficients in time "b" were negative and significant, indicating that the differences in proportions between Greek and UK industries were getting less during the period 1963-84, in the following industries: food, beverages (significant only at 5 % level, one-tail test), tobacco, footwear and wearing, paper and products, basic metals (significant only at 5 % level, one-tail test), transport equipment, and miscellaneous. Furthermore, the coefficients in time "b" were found insignificant in textiles industries, wood and cork, printing and publishing, chemicals, petrol and products, metal products, machinery, and electrical.

The absolute differences between the percentage distributions of capital stock were increasing over the entire period examined in furniture and fixtures, rubber and plastics, leather (significant only at 10 % level), and non-metallic minerals. From those four industries the first two had a greater share in the UK than in Greece while the reverse was true for the last two industries in most years over the period examined.

The values of capital stock in total Greek and UK manufacturing sectors were modified into a common currency ($ dollars) and their absolute differences were regressed against time, over the period 1963-84. The equation found is as follows:

The absolute differences between capital stock in Greek and UK manufacturing industries regressed against time, 1963-84.

$$Y = 38497 - \underset{(-1.77)}{3476}\,T \qquad R^2 = 0.10 \qquad d = 1.44 \qquad (4.1)$$

where Y is the absolute difference between the values of capital stock in Greek and UK manufacturing industries; T is time representing the period 1963-84; t-statistics can be seen in brackets and t = 1.725 at 5 % level and t = 2.086 at 5 % level, two-tail test. Source: as table 4.1.

It is apparent from the coefficient in time "b" (being significant at 5 % level, one-tail test), seen in equation 4.1, that there has been a convergence between the Greek and UK manufacturing industries in terms of capital stock across the period 1963-84. Since the convergence hypothesis is supported in respect of capital stock, a faster growth of capital stock in Greek manufacturing industry in comparison to the UK is anticipated over the same period of time.

Table 4.3 exhibits the percentage change of capital stock in Greek and UK manufacturing industries. A striking feature of this table is the much faster growth of capital stock for manufacturing as a whole, and for separate industries, achieved by Greece than the UK in the whole examined period 1963-84.

The Greek manufacturing industries that showed the fastest growth rates of capital stock, in the period 1963-84, were the

Table 4.3

PERCENTAGE CHANGE OF CAPITAL STOCK IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. (1974 constant prices)

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	29	20	105	38	67	5	0.4	6	343	84
Beverages	76	35	90	73	41	6	16	-3	447	138
Tobacco	121	46	7	25	54	14	8	63	295	239
Textiles	58	9	135	18	65	3	-27	-15	346	12
Footw. Wear.	124	10	316	25	129	-0.4	14	-1	2326	36
Wood-Cork	431	-8	245	47	29	18	0.3	-10	2265	43
Furniture	152	27	202	57	84	5	-11	1	1146	114
Paper-Prod.	126	19	48	35	73	0.8	-19	-12	370	41
Print. Publ.	365	18	144	25	44	9	32	24	2056	98
Leather	39	-0.9	13	41	89	-9	7	-57	218	-46
Rub. Plastics	151	110	106	58	76	13	0.8	-0.4	818	273
Chemicals	146	28	29	41	17	7	9	1	303	97
Petrol-Prod.	1467	78	435	-34	-18	68	18	-6	8017	85
Non Met. Min.	120	4	127	117	56	-15	11	2	760	96
Basic Metals	376	7	30	36	13	10	37	-10	864	46
Metal Prod.	213	13	123	25	54	3	22	-2	1216	43
Machinery	201	20	110	27	89	7	-25	6	789	72
Electrical	129	21	237	39	53	4	-33	1	689	77
Transport Eq.	66	11	203	15	94	-1	47	0.9	1344	27
Miscellaneous	63	15	197	33	165	1	-3	-8	1141	42
Total	130	19	98	33	46	5	6	-0.6	606	66

Source: Greece__ "The State of Greek Industry", different years; Federation of Greek Industrialists.
UK__ Central Statistical Office.

petrol and products of petroleum, footwear and wearing, wood and cork, printing and publishing, and transport equipment. In the same period, the equivalent industries for the UK were rubber and plastics, tobacco, beverages, furniture, and printing and publishing. The UK leather industry experienced a negative growth. Only the printing and publishing industry appeared in the top five industries with the fastest growth rates in terms of capital stock in both countries between 1963 and 1984.

Looking at the different sub-periods, it was in the period 1963-68 that the fastest growth rate of capital stock was gained in the total manufacturing sector in Greece. Furthermore, capital stock was increasing at a much faster rate over the first two sub-periods than since (largely influenced by accelerated investment, see appendix two) and that is in accordance with Economicos Tachedromos' findings.[2] UK manufacturing industry realized the fastest growth rate of capital stock in the period 1968-74 and that is in agreement with Sargent's[3] estimates.

During the last sub-period 1978-84, the rate of growth of capital stock decelerated in Greece and in the UK decreased largely as a result of the oil crisis that affected any plans for investment. Since 1982 capital stock started growing again in the UK but in Greece there were no signs of improvement.

To sum up, it is apparent from table 4.3 that capital stock increased much faster in Greece than in the UK in all sub-periods. Across the entire period examined, capital stock grew over nine times faster in Greece than in the UK and hence Greek industry has been catching up with the UK in terms of growth of capital stock.

Table 4.4

Correlation coefficients relating capital stock growth in Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	0.38 (s)
1968-74	-0.41 (s)
1974-78	-0.57 (s)
1978-84	0.11 (ns)
1963-84	-0.04 (ns)

s = significant at the 5 per cent level

ns = not significant at the 5 per cent level

source: table 4.3.

It can be said that the evolution of the capital stock structure in Greece and the UK has proceeded along more similar lines at the first sub-period than the rest. Over the periods 1968-74 and 1974-78 the correlation coefficients were negative indicating movement of the capital stock towards different directions since capital stock was increasing at a much faster rate in Greece than in the UK and UK growth rates were falling (between 1974-78). The association between 1978 and 1984 was positive but very low and insignificant.

It was expected to find a not significant correlation across the entire period examined since the patterns of growth of individual industries were different in both countries. Furthermore, capital stock increased in total Greek manufacturing over nine times as fast as in the UK (table 4.3) indicating a tendency of convergence between the patterns of growth of capital stock in the two industries.

Table 4.5

Sum of the absolute differences between the sectoral shares of gross capital stock in successive benchmark years, Greek and UK manufacturing industries, 1963-84.

Years	Greece	United Kingdom
1963 and 1968	31.8	8.0
1968 and 1974	30.2	10.2
1974 and 1978	17.8	4.8
1978 and 1984	17.6	5.8
1963 and 1984	47.4	19.4

source: table 4.1.

The purpose of the above table is to show to what extent there have been any structural changes of the percentage distribution of capital stock in Greek and UK manufacturing sectors.

It is obvious that during the whole examined period 1963-84, the structural changes of capital stock were by far higher in Greece than in the UK. That was expected as Greek manufacturing industry was going through a development process and the growth of its capital stock was accelerating at a faster rate than in the UK while UK industry was from the start more mature having already gone through an industrial revolution. In UK industry, the period in which the most substantial structural changes occurred was 1968-74 and for Greek manufacturing 1963-68.

- *Capital stock and output*

Table 4.6

Correlation coefficients relating capital stock growth and output growth in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	0.03 (ns)	-0.18 (ns)
1968-74	0.01 (ns)	0.13 (ns)
1974-78	0.29 (ns)	0.56 (s)
1978-84	0.58 (s)	-0.01 (ns)
1963-84	-0.08 (ns)	0.01 (ns)

s = significant at the 5 per cent level

ns = not significant at the 5 per cent level

source: tables 3.5 and 4.3.

The fact that there have been more structural changes of capital stock in Greek manufacturing industry could reflect a faster rate of growth of output. Table 4.6 indicates that there has been a not significant association between the changes of capital stock and output over most sub-periods due to faster increase of capital in relation to output.

Between 1978 and 1984 the performance of both capital stock and output deteriorated in Greek manufacturing, largely due to the second oil crisis, but having realized similar patterns of growth caused the correlation coefficient to be positive and significant.

Over the entire period examined, 1963-84, the relation between growth rates of capital stock and output proved to be negative and insignificant because of the twice as fast increase of capital stock of total Greek manufacturing regarding the growth of output and different patterns of growth of individual industries in respect of output and capital stock. (see tables 3.5 and 4.3).

In the context of UK industry, during 1963-68 and 1968-74 the correlation coefficients were insignificant pointing out poor association between growth rates of capital stock and output. It was only in the sub-period 1974-78 that the relation was positive and significant indicating similar patterns of growth.

Between 1978 and 1984 the correlation coefficient was near zero pointing out dissimilar patterns of growth of capital stock and output in the UK. A distinctive example of this phenomenon is the petroleum industry that in this period (i.e. 1978-84) realized a 114 per cent increase of its output whilst there has been a -6 per cent growth of its capital stock. This high growth of output of the petroleum industry, in the 1978-84 period, could have been affected by the 68 per cent increase of its capital stock in the previous period 1974-78 (see tables 3.5 and 4.3).

These findings agree with NEDO[4], that over short periods of time it is difficult to establish any relationship between capital input growth and output growth because of variations in the lagged response of inputs to output growth and different other short to medium term influences. Over the whole examined period, 1963-84, the association relating capital stock growth and output growth was not significant in UK manufacturing.

To sum up, during 1963-84 both industries showed insignificant relation between the patterns of growth of capital stock and output.

Table 4.7

PERCENTAGE DISTRIBUTION OF NUMBER OF PEOPLE EMPLOYED IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84.

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	17.7	7.2	17.0	7.2	16.1	7.5	14	7.4	14.3	9.1
Beverages	2.5	1.8	2.8	1.8	2.2	1.7	1.9	1.8	2	2
Tobacco	3.3	0.5	2.4	0.5	1.5	0.5	1.5	0.5	1.5	0.4
Textiles	12	9.5	11.4	8.4	11.9	7.5	11.7	6.8	9.4	4.4
Footw. Wear.	15	6.5	14.6	5.9	11.6	5.4	13	5.2	14.1	5.2
Wood-Cork	5.5	0.5	5.3	0.5	5.2	0.5	4.9	0.5	4.8	0.5
Furniture	4.3	2.8	4.6	3.2	4.2	3.1	4.6	3	4.5	3.2
Paper-Prod.	1.4	2.7	1.7	2.6	1.4	2.9	1.6	2.7	1.6	2.6
Print. Publ.	2.9	4.4	2.9	4.6	2.6	4.6	2.6	4.7	2.5	6.2
Leather	2	0.7	1.8	0.7	1.8	0.6	2.3	0.5	2.4	0.4
Rub. Plastics	1.7	2.3	2.1	2.7	2.6	3.2	2.9	3.1	2.9	3.2
Chemicals	2.7	5.2	3.2	5	3.6	5.5	3.9	6.1	4	6.3
Petrol-Prod.	0.3	0.6	0.4	0.7	0.7	0.5	0.7	0.6	0.8	0.7
Non Met. Min.	7	3.9	7	4	6.5	3.8	5.9	3.7	5.6	3.6
Basic Metals	0.6	6.8	1	6.6	1.5	6.4	1.5	6.3	1.6	3.8
Metal Prod.	8.3	6.3	8	6.5	8.4	7.4	8.1	7.5	7.6	6.9
Machinery	2.7	14.9	3	15.9	3.5	14.5	3.3	14.9	3.6	17.5
Electrical	2.7	9.5	3.7	10.3	4.8	10.7	4.5	10.4	4.2	11.9
Transport Eq.	5.6	12.6	5.3	11.5	8	12.4	9.4	12.9	10.9	10.8
Miscellaneous	1.8	1.3	1.8	1.4	1.9	1.3	1.7	1.4	1.7	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Greece__ "Annual Industrial Survey", National Statistical Service of Greece, years 1963, 1968 and 1974; "Statistical Yearbook of Greece", ed. 1985 for the year 1978; and "Census of Industry, Handicraft and Commerce" for the year 1984. UK__ "Annual Abstract of Statistics", different years. See also appendix one.

(ii) LABOUR INPUTS

Here, convergence between the patterns of growth of labour input in Greek and UK manufacturing industries will be considered.

The first part of this chapter showed that there was a similarity in the industrial distribution of capital stock between Greece and the UK. Is the same true in the context of labour force over the examined period 1963-84 ?

Table 4.7 reveals the percentage distribution of labour force in both manufacturing industries in 1963, 1968, 1974, 1978 and 1984.

It is apparent from table 4.7 that the Greek manufacturing industries that had the largest share of labour, over the entire period, were food, textiles, footwear and wearing, and in the last two benchmark years, 1978 and 1984, transport equipment as well. It is obvious that transport equipment industry has been increasing in importance in Greece, as shown by its rising share in terms of capital stock (table 4.1), employment and output (table 3.2).

The industries for the UK with the greatest portion in the total manufacturing during the whole examined period were the machinery and appliances, electrical supplies, and transport equipment, as well as food industry in 1984.

The manufacturing sectors that had among the largest labour share in the total in 1984 in both countries were the food and transport equipment industries.

Table 4.8

THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK DISTRIBUTIONS OF EMPLOYMENT REGRESSED AGAINST TIME,1963-84.
(1974 CONSTANT PRICES)

Food	Y = 11.2	- 0.31 T	R^2 = 0.74
		(-7.50)	d = 1.50
Beverages	Y = 0.38	- 0.05 T	R^2 = 0.37
		(-3.45)	d = 1.59
Tobacco	Y = 2.33	- 0.09 T	R^2 = 0.77
		(-8.20)	d = 1.46
Textiles	Y = 0.86	+ 0.13 T	R^2 = 0.43
		(3.87)	d = 1.85
Footw. Wear.	Y = 2.91	+ 0.03 T	R^2 = 0.14
		(0.30)	d = 1.97
Wood-Cork	Y = 2.04	- 0.03 T	R^2 = 0.15
		(-1.85)	d = 1.79
Furniture	Y = 1.40	+ 0.02 T	R^2 = 0.15
		(1.87)	d = 1.48
Paper-Prod.	Y = 0.29	- 0.01 T	R^2 = 0.14
		(-0.30)	d = 1.49
Print. Publ.	Y = 1.36	+ 0.07 T	R^2 = 0.72
		(7.20)	d = 1.45
Leather	Y = 0.55	+ 0.04 T	R^2 = 0.55
		(4.90)	d = 1.78
Rub. Plastics	Y = 0.60	- 0.01 T	R^2 = 0.25
		(-2.59)	d = 1.55
Chemicals	Y = 1.01	+ 0.02 T	R^2 = 0.14
		(1.81)	d = 1.83
Petrol-Prod.	Y = 0.13	- 0.004T	R^2 = 0.02
		(-0.57)	d = 1.60
Non Met. Min.	Y = 3.26	- 0.07 T	R^2 = 0.78
		(-8.53)	d = 1.49
Basic Metals	Y = 1.57	- 0.23 T	R^2 = 0.48
		(-4.33)	d = 1.92
Metal Prod.	Y = 0.55	- 0.04 T	R^2 = 0.27
		(-2.71)	d = 1.57
Machinery	Y = 2.05	+ 0.12 T	R^2 = 0.06
		(1.12)	d = 1.69
Electrical	Y = 0.09	- 0.51 T	R^2 = 0.19
		(-2.20)	d = 1.54
Transport Eq.	Y = 3.63	- 0.34 T	R^2 = 0.71
		(-7.01)	d = 1.82
Miscellaneous	Y = 0.12	- 0.002T	R^2 = 0.12
		(-0.13)	d = 1.57

where Y is the absolute difference between the Greek and UK distributions in terms of employment; T is time, representing the period 1963-84; t-statistics are in brackets and t = 1.325 at 10 % level, t = 1.725 at 5 % level, and t = 2.086 at 5 % level, a two-tail test. Source: as table 4.7.

Table 4.8 shows the absolute differences between the Greek and UK distributions of employment regressed against time, over the period 1963-84. Where autocorrelation was found was corrected in the way that is demonstrated in appendix one.

It is apparent from the coefficients in time "b" that the differences in proportions between Greek and UK industries narrowed over the entire period examined in the following industries: food, beverages, tobacco, wood and cork (significant only at 5 % level, one-tail test), rubber and plastics, non-metallic minerals, basic metals, metal products, electrical, and transport equipment.

The coefficients in time "b" were insignificant in footwear and wearing, paper and products, petrol, machinery, and miscellaneous. Hence, the differences between the shares of those Greek and UK industries did not diminish over time. From these industries, footwear and wearing had a larger share in Greece than in the UK while paper and products, and machinery had a greater share in the UK. Petrol and products as well as miscellaneous had similar distributions in both manufacturing industries.

The differences between the Greek and UK distributions in respect of employment increased, instead of diminishing, in textiles, furniture and fixtures (significant only at 5 % level, one-tail test), leather, printing and publishing, and chemicals (significant only at 5 % level, one-tail test). From these industries, the first three had a larger share in Greek industry while the last two had a larger share in the UK.

The absolute differences between the number of people employed in total Greek and UK manufacturing industries were regressed against time and the findings are as follows:

The absolute differences between the labour force in Greek and UK manufacturing industries regressed against time, 1963-84.

$$Y = 3469130 - \underset{(-11.6)}{81384}\,T \qquad R^2 = 0.87 \qquad d = 1.48 \qquad (4.2)$$

where Y is the absolute difference between the number of people employed in Greek and UK manufacturing industries; T is time representing the period 1963-84; t-statistics can be seen in brackets and t = 2.086 at 5 % level of significance, a two-tail test. Source: as table 4.7.

Equation 4.2 shows that there has been a convergence between the Greek and UK manufacturing industries in respect of labour force across the period 1963-84. Since the convergence hypothesis is supported in terms of labour, a faster growth of employment in Greek manufacturing industry than in the UK is expected over the same period of time.

Table 4.9 shows the percentage change of labour force in Greek and UK manufacturing industries. During the whole examined period there has been a fifty per cent increase of the Greek manufacturing employment while there has been an absolute decline by thirty eight per cent in the UK.

Employment in Greek industry has been increasing more rapidly until 1974 than in subsequent periods. These findings are in accordance with other studies.[2,5] Since 1981 labour force in

Table 4.9

PERCENTAGE CHANGE OF EMPLOYMENT IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84.

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	-0.1	0.9	14	-8	-0.1	-9	6	-7	20	-21
Beverages	17	-1	-6	-17	-0.5	-5	10	-16	21	-34
Tobacco	-26	-4	-22	-13	9	-7	5	-39	-33	-53
Textiles	-0.9	-11	27	-22	12	-16	-16	-50	17	-71
Footw. Wear.	1.5	-9	-4	-18	28	-11	13	-24	41	-50
Wood-Cork	-1	7	20	-23	7	-5	1	-14	30	-33
Furniture	12	15	10	-13	27	-10	2	-20	59	-28
Paper-Prod.	29	-2.5	0.9	-2	33	-13	-1	-27	70	-39
Print. Publ.	4	6	11	-13	12	-5	3	0.6	33	-13
Leather	-6	-9	19	-26	48	-12	10	-37	81	-62
Rub. Plastics	32	18	50	5	25	-9	4	-22	157	-12
Chemicals	25	-3	37	-3	21	1	6	-21	121	-25
Petrol-Prod.	27	2	111	-32	20	0	23	-2.5	296	-33
Non Met. Min.	4	4	13	-17	4	-12	-0.6	-25	21	-43
Basic Metals	69	-2	80	-14	9.8	-9	15	-54	283	-65
Metal Prod.	-0.3	4	28	0	9.7	-7	-3	-29	37	-32
Machinery	15	7	38	-20	9.6	-5	12	-11	94	-27
Electrical	41	9	57	-9	8	-10	-4	-13	129	-22
Transport Eq.	-0.9	-8.5	83	-5	34	-4	20	-36	193	-47
Miscellaneous	8	7	25	-13	1	-5	9	-27	49	-35
Total	4	0.4	21	-12	14	-8	4	-24	50	-38

Source: as table 4.7.

Greek manufacturing has been decelerating quite rapidly; according to Drakatos[5] this is a sign of deindustrialisation.

The striking feature of table 4.9 is that since the first sub-period there has been a continuous decrease of the labour force in UK manufacturing industry, the largest decrease occurring in the sub-period 1978-84 and in particular since 1980.[6,7]

During the 1963-84 period, not a single UK manufacturing industry increased its labour force; according to Thirlwall[8] this is a trend towards deindustrialisation. As far as Greek industry is concerned, over the whole examined period, the manufacturing sectors that realized the highest increase of their labour force were the petroleum and products, basic metals, transport equipment, and, rubber and plastics industries. Tobacco industry had a 33 per cent decrease of its labour force in Greece.

Therefore, the growth of labour input in Greek industry and the fall of labour force in the UK highlight that Greek industry was catching up with the UK in respect of growth of employment during 1963-84.

Table 4.10 shows that all correlations between employment growth rates in Greek and UK manufacturing industries were insignificant in all sub-periods and the entire period examined due to different patterns of employment growth rates in both countries. This is reinforcing what has already been said that Greek industry has been catching up with the UK in terms of growth of labour force, since labour input increased by 50 % in Greece and fell by 38 % in the UK between 1963 and 1984.

Table 4.10

Correlation coefficients relating labour input growth in Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	0.28 (ns)
1968-74	-0.08 (ns)
1974-78	-0.17 (ns)
1978-84	0.16 (ns)
1963-84	-0.03 (ns)

ns = not significant at the 5 per cent level

source: table 4.9.

Before ending this section it would be interesting to see whether there is any association between labour input growth and output growth in Greece and the UK.

- *Labour input and output*

Table 4.11

Correlation coefficients relating labour input growth and output growth in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	0.83 (s)	0.19 (ns)
1968-74	0.69 (s)	0.14 (ns)
1974-78	-0.60 (s)	0.60 (s)
1978-84	0.10 (ns)	0.61 (s)
1963-84	0.52 (s)	0.34 (ns)

s = significant at the 5 per cent level

ns = not significant at the 5 per cent level

source: tables 3.5 and 4.9.

Table 4.11 shows that between 1963 and 1984 there has been a positive and significant association relating to growth of employment and output for Greek industry and pointing to similar patterns of growth. The most comparable patterns of growth occurred in the 1963-68 period; there has been an insignificant association between 1978-84.

Over the entire period examined, 1963-84, there has been a positive and significant correlation between labour input growth and output growth in the Greek manufacturing, but negative and insignificant association relating capital stock growth and output growth (see table 4.6). Hence, the patterns of growth of output were more similar to those of labour than capital stock in the

Greek manufacturing during 1963-84.

There has been a non-significant correlation between labour input growth and output growth in UK industry during 1963-68, 1968-74, and over the whole examined period 1963-84. This was due to the dissimilarity of the patterns of growth of labour force and output in UK manufacturing industry over these periods of time. The most similar patterns of growth occurred in the period 1978-84.

Although the correlation coefficient relating labour input growth and output growth was insignificant in the UK during 1963-84, it was still higher than the correlation relating capital stock growth and output growth over the same period of time (see table 4.6).

Considering the entire period examined, Greek and UK industries did not enjoy similar experiences since the association between labour input and output growth was found positive and significant in Greece but insignificant in the UK.

(iii) CAPITAL AND LABOUR INPUTS AFTER EXCLUDING THE INFLUENCE OF OUTPUT

The purpose of this sub-section is to examine the net correlation between capital stock growth and labour input growth after excluding the common influence of output growth.

Therefore, the partial correlation between capital stock and labour growth is estimated after removing the influence of output growth from both factor inputs. The formula used can be seen in equation A.

$$r_{yx1.x2} = (r_{yx1} - r_{yx2}\, r_{x1x2}) / ((\sqrt{1 - r^2{x1x2}}) * (\sqrt{1 - r^2{yx2}})) \quad (A)$$

where r_{yx1} = simple correlation between y and x1, and ryx2 and r_{x1x2} are analogously defined.

Here the dependent variable y of the above equation would be growth of capital while x_1 the growth of labour and x_2 the growth of output.

The correlation coefficients between growth rates of labour and capital, labour and output, and, capital and output are substituted into equation (A) for Greece and the UK for all sub-periods and the entire period examined and the results can be seen in table 4.12.

Table 4.12

Partial correlation coefficients between the growth of capital stock and labour input after removing the effect of the growth of output in Greece and the UK, 1963-84.

Period	Greece	United Kingdom
1963-68	0.44 (s)	0.48 (s)
1968-74	0.56 (s)	0.21 (ns)
1974-78	0.45 (s)	0.32 (ns)
1978-84	0.64 (s)	0.25 (ns)
1963-84	0.66 (s)	0.49 (s)

s = significant at 5 % level

ns = not significant at 5 % level

source: as tables 3.5, 4.3 and 4.9.

To see whether the correlation coefficients in table 4.12 are significant, t-tests were considered.

Table 4.12 shows that in Greek manufacturing there has been a positive and significant association of growth of capital stock and labour while holding the growth of output constant over the entire period examined and all the sub-periods.

In the UK, the correlations were insignificant in all sub-periods except the first. That was expected due to fall of labour input employed in UK manufacturing in all sub-periods except the 1963-68 period.

Across the entire period examined, 1963-84, the partial correlation relating the growth of capital and labour input after removing the effect of growth of output was found positive and significant in both industries being higher in Greek manufacturing industry.

Table 4.13

CAPITAL INTENSITY "RELATIVES" IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. (1974 PRICES).

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	88	112	51	110	56	111	74	112	69	97
Beverages	208	142	141	163	174	223	192	220	199	193
Tobacco	49	75	66	97	56	91	61	99	62	204
Textiles	144	79	104	81	118	82	136	88	116	115
Footw. Wear.	3	30	3	29	7	30	10	30	10	30
Wood-Cork	8	46	19	32	34	41	32	45	31	36
Furniture	6	46	6	41	10	49	12	51	10	50
Paper-Prod.	378	126	299	129	268	116	274	119	221	109
Print. Publ.	14	82	29	76	38	73	39	73	49	69
Leather	32	60	21	54	12	68	12	61	12	32
Rub. Plastics	137	72	118	107	99	107	109	118	103	115
Chemicals	654	261	580	290	336	280	252	261	254	257
Petrol-Prod.	134	281	747	412	1158	263	620	390	583	288
Non Met. Min.	162	77	154	66	190	113	224	96	244	100
Basic Metals	1407	186	1793	172	797	181	641	194	751	292
Metal Prod.	48	96	68	90	73	74	80	72	98	76
Machinery	25	70	30	66	27	69	37	68	24	62
Electrical	85	63	62	57	82	58	91	59	62	53
Transport Eq.	96	116	73	118	74	94	84	85	101	103
Miscellaneous	15	100	10	90	15	90	31	85	27	81
Total	100	100	100	100	100	100	100	100	100	100

Source: as tables 4.1 and 4.7.

(iv) CAPITAL INTENSITY

This section examines convergence of the two countries' industries as regards capital intensity.

Capital intensity is nothing else but the ratio of capital stock to labour input.

Table 4.13 presents the ratios of capital to labour as "relatives" following NEDO's[4] pattern that is capital per employee in an industry as a percentage of capital per employee in total manufacturing. The use of "relatives", rather than straight forward data on capital stock per employee has the major advantage that each sector can be easily distinguished according to whether it is a relatively capital intensive or relatively labour intensive sector. Furthermore, figures for Greece and the UK can be compared directly as they are independent of units of measure.

As table 4.13 indicates, the rankings of both Greek and UK industries in terms of capital intensity were quite similar. The industries that were among the most capital intensive in both countries were basic metals, petroleum and products, and, chemicals and allied industries. In 1984, tobacco industry, furniture and miscellaneous appeared to be more capital intensive in the UK, while the industries that seemed more capital intensive in terms of rankings in Greece were basic metals as well as petroleum and products.

Table 4.14

THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK CAPITAL INTENSITY "RELATIVES" REGRESSED AGAINST TIME, 1963-84. (1974 CONSTANT PRICES).

Food	Y = 35.3 - 1.49 T		R^2 = 0.26
		(-2.68)	d = 1.57
Beverages	Y = 25.2 + 0.53 T		R^2 = 0.02
		(0.57)	d = 1.48
Tobacco	Y = -7.78 + 10.5 T		R^2 = 0.14
		(1.78)	d = 1.66
Textiles	Y = 41.6 - 0.77 T		R^2 = 0.12
		(-1.67)	d = 1.44
Footw. Wear.	Y = 7.59 - 0.36 T		R^2 = 0.30
		(-2.92)	d = 1.74
Wood-Cork	Y = 14.7 - 0.95 T		R^2 = 0.36
		(-3.35)	d = 1.65
Furniture	Y = 13.6 + 0.24 T		R^2 = 0.09
		(1.41)	d = 1.76
Paper-Prod.	Y = 125.9 - 2.98 T		R^2 = 0.25
		(-2.56)	d = 1.62
Print. Publ.	Y = 53.4 - 1.46 T		R^2 = 0.75
		(-7.75)	d = 1.50
Leather	Y = 8.95 - 3.44 T		R^2 = 0.11
		(-1.59)	d = 1.73
Rub. Plastics	Y = 22.1 - 0.87 T		R^2 = 0.13
		(-1.72)	d = 1.49
Chemicals	Y = 403.9 - 23.7 T		R^2 = 0.83
		(-10.1)	d = 1.51
Petrol-Prod.	Y = 322.5 - 16.3 T		R^2 = 0.08
		(-1.35)	d = 1.63
Non Met. Min.	Y = 34.5 + 5.48 T		R^2 = 0.57
		(5.14)	d = 1.61
Basic Metals	Y = 1428 - 90.2 T		R^2 = 0.74
		(-7.66)	d = 1.47
Metal Prod.	Y = 32.1 - 1.09 T		R^2 = 0.23
		(-2.45)	d = 1.48
Machinery	Y = 25.8 - 0.58 T		R^2 = 0.23
		(-2.47)	d = 1.65
Electrical	Y = 3.20 + 0.29 T		R^2 = 0.01
		(0.34)	d = 1.56
Transport Eq.	Y = 18.9 - 1.55 T		R^2 = 0.43
		(-3.91)	d = 1.44
Miscellaneous	Y = 32.8 - 1.76 T		R^2 = 0.57
		(-5.21)	d = 1.65

where Y is the absolute difference between the Greek and UK distributions in terms of capital intensity "relatives"; T is time, representing the period 1963-84; t-statistics are in brackets and t = 1.325 at 10 % level, t = 1.725 at 5 % level, t = 2.086 at 5 %, two-tail test. Source: as tables 4.1 and 4.7.

The absolute differences between the capital intensity "relatives" in Greek and UK manufacturing industries were regressed against time, over the period 1963-84, and the findings can be seen in table 4.14. All equations are free of autocorrelation.

It is obvious from the coefficients in time "b" that the differences between the Greek and UK capital intensity "relatives" diminished across the period 1963-84 in the following industries: food, textiles (significant only at 10 % level), footwear and wearing, wood and cork, paper and products, printing and publishing, leather (significant only at 10 % level), rubber and plastics (significant only at 5 % level, one-tail test), chemicals, petrol and products (significant only at 10 % level), basic metals, machinery, transport equipment, and miscellaneous.

The coefficients in time "b" were proven to be insignificant in beverages and electrical industries showing that time had an insignificant impact on narrowing the differences between the Greek and UK capital intensity "relatives" of those industries. Furthermore, the coefficients in time "b" were found positive and significant (indicating no tendency of convergence) in the following industries: tobacco (significant only at 5 % level, one-tail test), furniture and fixtures (significant only at 10 % level), and non-metallic minerals. From these industries the first two appeared to be more capital intensive in terms of ranking in the UK while the reverse was true in the case of non-metallic minerals industry.

The absolute differences between the Greek and UK capital stock to labour ratios (valued in dollars, \$) were regressed against time and the equation found is:

The absolute differences between the capital intensity in Greek and UK manufacturing industries regressed against time, 1963-84.

$$Y = 14.03 - 0.53\,T \qquad R^2 = 0.19 \qquad (4.3)$$
$$(-2.15) \qquad d = 1.72$$

where Y is the absolute difference between the capital/labour ratios in Greek and UK manufacturing industries; T is time representing the period 1963-84; t-statistics can be seen in brackets and t = 2.086 at 5 % level. Source: as table 4.13.

Equation 4.3 shows that there has been a convergence between the Greek and UK manufacturing industries in respect of capital intensity across the entire period examined. Since the convergence hypothesis is supported in terms of capital intensity a faster growth of capital intensity in Greek manufacturing industry in comparison to the UK is expected.

The previous sections of this chapter (tables 4.3 and 4.9) have already shown that capital stock and employment grew faster in Greece than in the UK. It is not surprising then that capital intensity accelerated faster in Greece as well, during the whole examined period and all the sub-periods but the last, as table 4.15 exhibits.

Table 4.15

PERCENTAGE CHANGE OF CAPITAL INTENSITY IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84.(1974 CONSTANT PRICES)

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	29	17	79	52	67	15	-5	14	268	133
Beverages	50	37	101	107	41	12	5	15	350	264
Tobacco	197	53	37	42	41	23	3	169	492	626
Textiles	60	22	85	53	48	23	-13	71	280	291
Footw. Wear.	121	18	333	55	79	13	0.4	31	1620	171
Wood-Cork	436	-15	186	91	20	26	-1	4	1724	111
Furniture	125	8	174	82	45	18	-13	27	681	192
Paper-Prod.	75	22	47	36	31	16	-18	19	176	131
Print. Publ.	346	11	120	44	29	15	28	23	1525	125
Leather	49	9	-5	89	28	3	-3	-32	76	44
Rub. Plastics	91	78	37	51	41	25	-3	27	257	329
Chemicals	96	32	-5	46	-4	6	2	28	83	164
Petrol-Prod.	1134	75	153	-3	-31	68	-4	-3	1952	175
Non Met. Min.	111	2	101	158	50	-3	11	37	611	248
Basic Metals	182	10	-27	59	3	22	19	97	152	322
Metal Prod.	214	11	74	25	40	10	26	38	863	111
Machinery	162	12	52	58	72	13	-33	19	357	137
Electrical	62	8	114	54	42	15	-30	17	244	125
Transport Eq.	68	21	65	21	45	3	22	57	393	138
Miscellaneous	51	7	136	52	162	6	-11	25	734	117
Total	121	19	63	51	28	14	2	31	371	168

Source: as tables 4.1 and 4.7.

It was in the sub-period 1963-68 that the highest growth of capital intensity took place in Greek manufacturing due to rapid acceleration of capital stock while the growth of labour was moderate. In the UK this period was the 1968-74 confirming Sargent's[3] findings. Between 1978 and 1984 capital intensity speeded up in the UK due to greater fall of labour input in relation to capital stock. To be most precise, capital intensity did not increase, during 1978-84, as a result of greater growth of capital stock in relation to labour but due to larger fall of growth of labour (- 24 %) in comparison to capital stock (- 0.6%).

Looking at the whole examined period 1963-84, the manufacturing industries that gained the highest growth of capital intensity in Greece were the petroleum and products, wood and cork, footwear and wearing, and, printing and publishing. For the UK the equivalent industries were tobacco, rubber and plastics, basic metals, and textiles.

During all sub-periods except the last, capital intensity was increasing much faster in Greece than in the UK showing a trend towards convergence of the two industries. Even in the last sub-period when capital intensity grew more rapidly in the UK than in Greece it is difficult to argue that UK industry performed better than the Greek. The reason being that over this period of time, the rise of capital intensity in the UK was due to greater fall of growth of employment in relation to capital while in Greece the slow rise of capital intensity was owed to moderate increase of capital in relation to labour.

To sum up, capital intensity of total Greek manufacturing accelerated over twice as fast as in the UK highlighting that Greek industry has been catching up with the UK in respect of growth of capital intensity.

Table 4.16

Correlation coefficients relating capital intensity growth rates in Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	0.37 (s)
1968-74	0.06 (ns)
1974-78	-0.49 (s)
1978-84	0.25 (ns)
1963-84	-0.17 (ns)

s = significant at the 5 per cent level

ns = not significant at the 5 per cent level

source: table 4.15.

Table 4.16, reveals that the patterns of growth of capital intensity in the two manufacturing industries were most similar in the period 1963-68 and dissimilar in the period 1974-78. In the periods 1968-74 as well as 1978-84 the correlation coefficients were insignificant, showing unsimilarity of the patterns of growth of capital intensity of the two manufacturing industries.

During 1963-84 the relation between capital intensity growth rates in both industries was proven to be negative and insignificant. This was expected since Greek and UK manufacturing industries experienced different patterns of growth and capital intensity increased over twice as fast in Greece than in the UK showing tendency of Greek industry catching up with the UK in terms of growth of capital intensity.

C. CAPITAL-LABOUR PRODUCTIVITY AND LABOUR COSTS

(i) CAPITAL PRODUCTIVITY

This part of the analysis will study a convergence between the patterns of growth of capital productivity in Greek and UK manufacturing industries.

Capital productivity is defined as output per unit of capital. As NEDC[7] says this measure is not accurate partly because the stock of fixed capital is difficult to estimate, and true depreciation is hard to calculate.

Table 4.17 shows the output per capital ratios as "relatives" estimated in the same way as capital to labour "relatives" that are demonstrated in table 4.13. Using "relatives" instead of straight forward data makes it easier to distinguish the industries that have been more capital productive than others.

It is apparent from table 4.17 that the rankings of both Greek and UK industries in terms of capital productivity were more similar in 1984 than at the starting point of the period examined, that is 1963.

Table 4.17

CAPITAL PRODUCTIVITY "RELATIVES" IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. (1974 PRICES).

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	100	78	171	75	150	67	117	100	140	100
Beverages	50	92	71	75	83	67	100	67	120	67
Tobacco	300	617	214	362	200	300	183	300	160	167
Textiles	90	97	129	100	133	100	100	67	160	33
Footw. Wear.	2820	189	2600	150	1067	167	617	167	640	167
Wood-Cork	760	156	314	825	183	1000	183	767	180	667
Furniture	920	205	1171	75	583	67	400	100	260	67
Paper-Prod.	50	108	57	100	67	133	33	100	80	133
Print. Publ.	650	114	286	100	233	100	217	100	320	100
Leather	320	119	514	100	733	100	317	100	280	267
Rub. Plastics	80	142	86	75	133	100	100	67	120	100
Chemicals	20	61	29	50	50	67	50	33	80	67
Petrol-Prod.	710	44	100	25	33	67	50	67	60	133
Non Met. Min.	60	128	71	125	67	100	50	100	60	33
Basic Metals	20	64	29	50	67	67	50	33	60	27
Metal Prod.	150	100	100	100	100	100	67	100	80	100
Machinery	390	133	314	125	317	133	183	133	160	133
Electrical	160	150	200	125	133	133	83	133	140	133
Transport Eq.	100	89	100	75	117	100	67	100	60	67
Miscellaneous	310	83	529	75	467	100	267	100	280	100
Total	100	100	100	100	100	100	100	100	100	100

Source: as tables 3.4 and 4.1.

The industries that were more capital productive in Greece were as follows: footwear and wearing, printing and publishing, leather, and miscellaneous. The equivalent industries in the UK were: wood and cork, leather, tobacco, and footwear and wearing. In both Greece and the UK, the industries that were among the most capital productive were footwear and wearing (being more capital productive in Greece) and leather.

To test whether the output per capital ratios in Greek and UK manufacturing industries were getting closer with time, their absolute differences were regressed against time. It has already been said that there has not been any data in terms of gross domestic product, at a disaggregate level, for UK manufacturing industry for the years 1964-67, and 1969. Therefore, the regressions could only be run for the Greek and UK manufacturing industries, at a disaggregate level, for the years 1970-84. The findings are exhibited in table 4.18 and all equations are free of autocorrelation.

The coefficients in time "b" were negative and significant in the following industries: food, footwear and wearing (significant only at 5 % level, one-tail test), wood and cork (significant only at 10 % level), furniture and fixtures, leather, rubber and plastics, petrol and products (significant only at 10 % level), metal products, machinery, transport equipment, and miscellaneous. Hence, there has been a convergence between the above Greek and UK industries in terms of capital productivity, over the period 1970-84.

Table 4.18

THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK CAPITAL PRODUCTIVITIES REGRESSED AGAINST TIME, 1970-84. (1974 CONSTANT PRICES)

Food	Y = 0.67 - 0.02 T		R^2 = 0.57
		(-4.18)	d = 1.92
Beverages	Y = 0.34 - 0.003T		R^2 = 0.03
		(-0.68)	d = 1.61
Tobacco	Y = 0.26 + 0.01 T		R^2 = 0.03
		(0.65)	d = 1.59
Textiles	Y = 0.51 - 0.001T		R^2 = 0.003
		(-0.22)	d = 1.44
Footw. Wear.	Y = 1.42 - 0.32 T		R^2 = 0.20
		(-1.82)	d = 1.49
Wood-Cork	Y = 1.20 - 0.06 T		R^2 = 0.15
		(-1.52)	d = 1.51
Furniture	Y = 4.54 - 0.27 T		R^2 = 0.91
		(-11.5)	d = 1.49
Paper-Prod.	Y = 0.08 - 0.004T		R^2 = 0.06
		(-0.94)	d = 1.91
Print. Publ.	Y = 1.34 - 0.02 T		R^2 = 0.11
		(-1.27)	d = 1.48
Leather	Y = 1.68 - 0.31 T		R^2 = 0.58
		(-4.26)	d = 1.46
Rub. Plastics	Y = 0.47 - 0.01 T		R^2 = 0.42
		(-3.04)	d = 1.44
Chemicals	Y = 0.10 + 0.01 T		R^2 = 0.27
		(2.22)	d = 2.14
Petrol-Prod.	Y = 0.17 - 0.01 T		R^2 = 0.18
		(-1.71)	d = 1.50
Non Met. Min.	Y = 0.01 + 0.01 T		R^2 = 0.14
		(1.44)	d = 1.75
Basic Metals	Y = 0.04 + 0.01 T		R^2 = 0.13
		(1.38)	d = 1.50
Metal Prod.	Y = 0.50 - 0.03 T		R^2 = 0.71
		(-5.60)	d = 1.47
Machinery	Y = 1.43 - 0.08 T		R^2 = 0.78
		(-6.87)	d = 1.49
Electrical	Y = 0.12 - 0.02 T		R^2 = 0.02
		(-0.55)	d = 1.56
Transport Eq.	Y = 0.50 - 0.03 T		R^2 = 0.85
		(-8.53)	d = 1.50
Miscellaneous	Y = 1.44 - 0.14 T		R^2 = 0.70
		(-5.48)	d = 1.53

where Y is the absolute difference between the Greek and UK capital productivities; T is time, representing the period 1970-84; t-statistics are in brackets and t = 1.350 at 10 % level, t = 1.771 at 5 % level and t = 2.160 at 5 %, two-tail test. Source: as tables 3.4 and 4.1.

The convergence hypothesis was rejected in the case of chemicals, non-metallic minerals (significant only at 10 % level) and basic metals (significant only at 10 % level). Furthermore, the coefficients in time "b" were found insignificant in beverages, tobacco, textiles, paper and products, printing and publishing, and electrical industries.

Aggregate figures exist in respect of output and capital stock for both manufacturing industries over the entire period examined. Therefore, capital productivities of total Greek and UK manufacturing industries were estimated during the period 1963-84, their absolute differences were calculated which were then regressed against time. The equation found is as follows:

The absolute differences between the capital productivity in Greek and UK manufacturing industries regressed against time, 1963-84.

$$Y = 0.31 - 0.01\,T \qquad R^2 = 0.46 \qquad (4.4)$$
$$(-4.13) \qquad d = 1.44$$

where Y is the absolute difference between the output/capital ratios in Greek and UK manufacturing industries; T is time representing the period 1963-84; t-statistics can be seen in brackets and t = 2.086 at 5 % level of significance.

Source: as table 4.17.

Equation 4.4 demonstrates that there has been a convergence between Greek and UK manufacturing industries in terms of capital productivity across the period 1963-84.

Table 4.19 shows the percentage change of capital productivity for both Greek and UK industries. As this table exhibits, there has been a negative growth of capital productivity for both Greek and UK manufacturing sectors and for most of their industries, during the whole examined period 1963-84 and all the sub-periods.

This negative growth of capital productivity confirms what has already been seen in tables 3.5 and 4.3 that the growth of capital stock outstripped output growth in both countries over the period 1963-84 as a whole. The findings on capital productivity for Greece are in accordance with others.[9] The steepest fall for the UK, occurred between 1968 and 1974.[3]

Turning to individual industries, over the 1963-84 period, only beverages, chemicals and allied, and, basic metals did not experience a fall of capital productivity in Greece. For the UK the equivalent industries were food, wood and cork, leather, and, petroleum and products.

Table 4.19

PERCENTAGE CHANGE OF CAPITAL PRODUCTIVITY IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84.(1974 CONSTANT PRICES)

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	13	-3	-27	-7	-14	4	-6	7	-33	0.6
Beverages	15	-12	-4	-43	11	10	-5	-12	16	-51
Tobacco	-49	-35	-18	-37	-13	-3	-24	-45	-72	-78
Textiles	8	-0.3	-19	-24	-19	-14	24	-33	-13	-56
Footw. Wear.	-36	-8	-65	-14	-42	-2	-13	-5	-88	-26
Wood-Cork	-71	481	-48	-8	-0.2	-23	-16	-12	-87	261
Furniture	-11	-57	-57	-26	-31	5	-47	-19	-86	-73
Paper-Prod.	-20	7	13	-15	-45	-8	59	12	-20	-7
Print. Publ.	-69	5	-30	-24	-6	7	18	-2	-75	-16
Leather	11	4	23	-26	-57	-3.5	-26	159	-56	93
Rub. Plastics	-21	-32	25	-27	-25	-5	-3	8	-28	-49
Chemicals	-17	-16	71	-21	2	7	-0.2	11	44	-21
Petrol-Prod.	-90	-17	-66	75	16	-16	3	128	-96	178
Non Met. Min.	-18	0.5	-26	-49	-8	32	-4	-57	-47	-71
Basic Metals	-17	-13	127	-9	-13	-31	-6	-37	55	-66
Metal Prod.	-52	-0.2	-16	-12	-27	0.9	0.4	-18	-71	-28
Machinery	-45	9	-14	-27	-41	7	-24	-7	-79	-21
Electrical	-11	-5	-47	-20	-35	0.3	39	5	-57	-20
Transport Eq.	-30	-6	3	-3	-41	2.4	-24	-22	-68	-27
Miscellaneous	22	8	-26	-20	-43	1.5	-10	10	-54	-3
Total	-29	-5	-9	-19	-14	-1	-5	-6	-47	-29

Source: as tables 3.4 and 4.1.

The patterns of growth of capital productivity were dissimilar in the different sub-periods in Greece and the UK. Capital productivity decreased in Greece between 1963 and 1968, improved during 1968-74, deteriorated within 1974-78 and ameliorated in the last sub-period. In the UK the moderate fall of capital productivity in the first sub-period deteriorated during 1968-74, improved between 1974 and 1978 and worsened in the last sub-period. Over the entire period examined, the fall of capital productivity was steeper in Greece than in the UK quite expectedly since the growth of capital stock grew by far faster in relation to output in Greek industry in comparison to the UK.

Table 4.20 considers the association between capital productivity growth rates in Greek and UK manufacturing industries during different sub-periods and the entire period examined, 1963-84.

Table 4.20

Correlation coefficients relating capital productivity growth rates in Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	-0.33 (ns)
1968-74	-0.19 (ns)
1974-78	-0.05 (ns)
1978-84	-0.01 (ns)
1963-84	-0.37 (s)

s = significant at the 5 per cent level

ns = not significant at the 5 per cent level

source: table 4.19.

It is apparent from table 4.20 that there was little tendency for the pattern of changes of capital productivity to be the same in the two countries. But, during 1963-84, the decline of growth of capital productivity was more intensive in Greece than in the UK (table 4.19) as capital stock was increasing at a faster extent than output partly influenced by the more rapid growth of investment in Greece than in the UK (see appendix two).

- *Capital productivity and output*

Table 4.21 displays the correlation coefficients relating capital productivity growth and output growth for both countries.

Table 4.21

Correlation coefficients relating capital productivity growth and output growth in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	0.29 (ns)	0.98 (s)
1968-74	0.57 (s)	0.36 (ns)
1974-78	0.32 (ns)	0.45 (s)
1978-84	0.58 (s)	0.74 (s)
1963-84	0.72 (s)	0.90 (s)

s = significant at 5 % level

ns = not significant at 5 % level

source: tables 3.5 and 4.19.

Table 4.21 shows insignificant correlations relating capital productivity growth and output growth in Greece over the periods 1963-68 and 1974-78 and significant correlations for the rest of sub-periods. During all sub-periods except the period 1968-74 the correlations were positive and significant in UK manufacturing industry pointing similar patterns of changes of capital productivity and output.

In the UK and in Greece, between 1963 and 1984, the correlation coefficients were positive and high indicating similar patterns of growth of capital productivity and output.

(ii) LABOUR PRODUCTIVITY

This section will consider convergence between the patterns of growth in Greek and UK manufacturing industries with respect to growth of labour productivity.

Labour productivity is defined as output per unit of labour.

At first labour productivity "relatives" are estimated in the same way as capital intensity and capital productivity "relatives" were calculated. The labour productivity "relatives" can be seen in table 4.22.

The rankings of both manufacturing industries in respect of labour productivity were more similar than in terms of capital productivity.

It is apparent from table 4.22 that the industries that were among the most labour productive in Greece, during 1963-84, were as follows: basic metals, petrol and products, beverages, textiles, and chemicals. The equivalent industries in the UK were: petrol and products, tobacco, wood and cork, chemicals, and paper and products.

Beverages, textiles and basic metals were more labour productive in respect of ranking in Greece than in the UK while the reverse was true in the case of tobacco, and wood and cork industries. During 1963-84, the industries that seemed to be among the most labour productive in both Greece and the UK were petrol and products, and chemicals.

Table 4.22

LABOUR PRODUCTIVITY "RELATIVES" IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. (1974 PRICES).

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	93	90	86	91	75	104	99	109	91	108
Beverages	99	135	108	139	140	136	200	147	207	123
Tobacco	149	480	142	413	107	307	120	322	97	387
Textiles	127	80	138	83	139	79	150	75	168	69
Footw. Wear.	79	55	71	56	74	61	70	56	63	59
Wood-Cork	60	70	60	313	59	454	65	381	55	287
Furniture	57	95	73	39	57	43	52	47	25	38
Paper-Prod.	171	140	152	156	169	150	111	141	151	154
Print. Publ.	93	95	82	100	85	89	94	94	148	95
Leather	104	70	109	70	85	82	43	72	32	102
Rub. Plastics	105	105	101	109	116	96	112	103	109	115
Chemicals	158	165	163	156	177	150	158	147	167	174
Petrol-Prod.	956	125	729	161	416	221	300	275	307	497
Non Met. Min.	97	105	107	91	106	100	133	109	148	51
Basic Metals	267	125	397	104	439	121	357	91	415	92
Metal Prod.	74	100	70	96	69	86	64	84	83	77
Machinery	99	95	90	100	78	96	73	100	38	92
Electrical	134	95	123	87	95	86	79	87	79	90
Transport Eq.	95	105	70	104	80	104	62	94	60	95
Miscellaneous	48	85	56	83	65	86	89	81	74	92
Total	100	100	100	100	100	100	100	100	100	100

Source: as tables 3.4 and 4.7.

The absolute differences between the labour productivity "relatives" in Greek and UK manufacturing industries were regressed against time and the findings are demonstrated in table 4.23. Due to unavailable data in respect of gross domestic product for UK industry at a disaggregated level for the years 1964-67 and 1969, the regression analyses could only be considered for the period 1970-84.

It is apparent from the coefficients in time "b" that the differences between the Greek and UK labour productivity "relatives" narrowed, over the period 1970-84, in the following industries: footwear and wearing, wood and cork, paper and products (significant only at 10 % level), chemicals, petrol and products (significant only at 10 % level), basic metals, metal products (significant only at 10 % level), electrical, and miscellaneous. Time had an insignificant impact on diminishing the differences between the labour productivity "relatives" in food industries, tobacco, furniture and fixtures, rubber and plastics, and transport equipment.

The coefficients in time "b" were positive and significant, indicating that the absolute differences between the Greek and UK labour productivity "relatives" increased, in the following industries: beverages, textiles, printing and publishing, non-metallic minerals, leather, and machinery. From these industries, the first four had (in most years during 1970-84) higher labour productivity "relatives" in Greece while the reverse was true for the other two industries.

Table 4.23

THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK LABOUR PRODUCTIVITY "RELATIVES" REGRESSED AGAINST TIME, 1970-84. (1974 CONSTANT PRICES).

Food	$Y = 18.6 - 0.28\,T$		$R^2 = 0.02$
		(-0.53)	d = 1.37
Beverages	$Y = 5.67 + 6.22\,T$		$R^2 = 0.52$
		(3.77)	d = 1.38
Tobacco	$Y = 240 - 0.80\,T$		$R^2 = 0.01$
		(-0.29)	d = 1.40
Textiles	$Y = 44.4 + 4.59\,T$		$R^2 = 0.88$
		(9.68)	d = 1.42
Footw. Wear.	$Y = 17.8 - 0.89\,T$		$R^2 = 0.54$
		(-3.92)	d = 1.83
Wood-Cork	$Y = 378 - 8.43\,T$		$R^2 = 0.63$
		(-4.66)	d = 1.60
Furniture	$Y = 15.6 - 0.29\,T$		$R^2 = 0.04$
		(-0.73)	d = 1.83
Paper-Prod.	$Y = 24.4 - 1.11\,T$		$R^2 = 0.16$
		(-1.55)	d = 1.44
Print. Publ.	$Y = 0.45 + 2.08\,T$		$R^2 = 0.32$
		(2.47)	d = 1.52
Leather	$Y = -11 + 5.69\,T$		$R^2 = 0.79$
		(6.98)	d = 1.55
Rub. Plastics	$Y = 16.5 - 0.51\,T$		$R^2 = 0.04$
		(-0.73)	d = 1.90
Chemicals	$Y = 39.2 - 2.14\,T$		$R^2 = 0.54$
		(-3.91)	d = 1.83
Petrol-Prod.	$Y = 259.5 - 9.18\,T$		$R^2 = 0.13$
		(-1.38)	d = 1.60
Non Met. Min.	$Y = -19.8 + 9.50\,T$		$R^2 = 0.70$
		(5.53)	d = 1.61
Basic Metals	$Y = 422 - 14.9\,T$		$R^2 = 0.54$
		(-3.95)	d = 1.59
Metal Prod.	$Y = 20.9 - 0.89\,T$		$R^2 = 0.14$
		(-1.43)	d = 1.60
Machinery	$Y = 19.9 + 1.81\,T$		$R^2 = 0.40$
		(2.97)	d = 1.38
Electrical	$Y = 18.5 - 1.08\,T$		$R^2 = 0.51$
		(-3.65)	d = 1.81
Transport Eq.	$Y = 24.2 + 0.58\,T$		$R^2 = 0.11$
		(1.29)	d = 1.92
Miscellaneous	$Y = 24.7 - 1.37\,T$		$R^2 = 0.38$
		(-2.82)	d = 1.85

where Y is the absolute difference between the Greek and UK distributions in terms of labour productivity "relatives"; T is time, representing the period 1970-84; t-statistics are in brackets and t = 1.350 at 10 % level, at t = 1.771 at 5 % level, t = 2.160 at 5 %, two-tail test. Source: as tables 3.4 and 4.7.

Aggregate figures exist in terms of gross domestic product and labour input for Greek and UK manufacturing industries during 1963-84. The absolute differences between the labour productivities in Greek and UK manufacturing industries (converted into a common currency, dollars $) were regressed against time and the equation found is 1.3 (see page 11) which has already been demonstrated in chapter one.

Equation 1.3 showed that there has been a convergence between Greek and UK manufacturing industries in respect of labour productivity during 1963-84. Since the convergence hypothesis is supported in terms of labour productivity, a faster rise of labour productivity in Greek industry in comparison to the UK is also anticipated.

Table 4.24 presents the percentage change of labour productivity of both Greek and UK manufacturing industries for the period as a whole and each sub-period.

The picture for labour productivity is totally different to that of capital productivity. Labour productivity of both Greek and UK manufacturing sectors accelerated rapidly, during the 1963-84 period. The growth rate of labour productivity of Greek manufacturing was higher than in the UK over that length of time.

Table 4.24

PERCENTAGE CHANGE OF LABOUR PRODUCTIVITY IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84.

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	46	15	31	40	45	20	-11	21	145	136
Beverages	73	20	93	19	57	23	-0.02	1	423	78
Tobacco	50	-0.6	13	-10	23	19	-22	47	63	58
Textiles	72	22	50	16	19	5	8	14	231	70
Footw. Wear.	42	12	54	33	4	10	-13	23	98	102
Wood-Cork	56	402	48	76	20	-4	-17	-8	129	678
Furniture	99	-53	18	34	0.5	23	-54	3	8	-20
Paper-Prod.	41	30	66	16	-28	7	31	33	120	115
Print. Publ.	40	17	55	9	21	23	51	21	298	90
Leather	66	14	17	41	-45	-0.6	-28	75	-23	178
Rub. Plastics	51	20	72	10	6	19	-6	39	158	116
Chemicals	63	11	61	15	-2	14	2	43	164	108
Petrol-Prod.	20	45	-15	70	-21	42	-1	120	-20	667
Non Met. Min.	73	0.9	48	34	38	27	7	-42	280	-0.8
Basic Metals	135	-4	65	44	-11	-16	12	23	289	43
Metal Prod.	50	9	46	10	1	12	26	13	181	51
Machinery	43	23	30	16	2	20	-49	10	-3	88
Electrical	45	5	14	22	-8	17	-3	22	47	83
Transport Eq.	17	13	70	18	-14	6	-8	23	57	74
Miscellaneous	85	15	74	23	49	8	-20	39	286	113
Total	58	13	49	22	10	13	-3	22	150	90

Source: as tables 3.4 and 4.7.

Turning to individual industries, in the course of 1963-84, the manufacturing sectors with the fastest growth rates in Greece were the beverages, printing and publishing, basic metals, miscellaneous, and textiles. In the UK the equivalent industries were wood and cork, petroleum and products, leather, food, and, rubber and plastics.

There were also some manufacturing sectors that declined over the entire period that were, for Greece: the leather industries, petroleum and products, and, machinery and appliances. In the UK the parallel industries were furniture, and, non-metallic minerals.

Looking at the different sub-periods it was in the 1963-68 period that was succeeded the fastest growth of labour productivity in Greece. Furthermore, the labour productivity of Greek manufacturing was accelerating at a much faster rate until 1973, than since, and these findings are in accordance with others.[5,10]

The factor behind the rapid increase of labour productivity in Greece during 1963-74 was that output was growing much faster than labour. Over the period 1974-78, labour productivity slowed down, partly as a result of deceleration of the growth of output that was largely affected by the 1973 oil crisis.

In the last sub-period Greek manufacturing industry faced an absolute decline in terms of labour productivity, due to greater growth of labour (4 %) in relation to output (1 %). The growth of production of Greek manufacturing was hit badly by the second oil crisis that boosted prices of raw materials and oil. Since 1982 there has been recorded a slight improvement of productivity, mainly due to deceleration of employment and, between 1983 and 1984 largely owed to growth of output.[1]

In UK manufacturing, labour productivity increased quickly over the first two sub-periods reaching its peak in 1973, this is in conformity with other findings.[11] The growth of labour productivity, during 1968-74, was largely due to increase of output influenced by a healthy consumption (23.3 % rise between 1968 and 1974) but also fall of growth of labour force (- 12 %).

The 1973 oil crisis brought UK manufacturing into a recession and labour productivity fell between 1973 and 1974. During the sub-period 1974-78 labour productivity increased but at a slower rate than that realized between 1968 and 1974, this agrees with others results.[12,13] The growth of productivity in the UK, across the period 1974-78, was associated with the rate of growth of output but also fall of labour force.

The second oil crisis in 1979 and world recession influenced a fall of UK manufacturing production as well as labour productivity in 1980. Since then the rise of labour productivity was largely owed to rapid falls in employment (table 4.7). These findings agree with OECD[14] and NEDC[7]. It is interesting to note that between 1978 and 1984 there has been a decrease of growth of output by 7 % (table 3.5) and labour input by 24 % (table 4.9) in the UK. Therefore, the growth of labour productivity in UK industry over that period of time was due to greater fall of labour in relation to output.

Labour productivity grew faster in both Greek and UK manufacturing sectors between 1963 and 1973 than since. After the second oil crisis labour productivity started speeding up in the UK and Greece since 1980 and 1982, respectively.

To sum up, it is apparent from table 4.24 that there was a tendency towards convergence during the first two sub-periods when labour productivity was increasing at a much faster rate in Greek manufacturing than in the UK. Across the last two sub-periods the growth rate of labour productivity in the UK surpassed that of Greece.

During 1963-84 the growth of labour productivity in Greece (150 %) was much higher than in the UK (90 %) indicating tendency of convergence between the patterns of growth of labour productivity in Greek and UK manufacturing industries. The growth of labour productivity in both industries was more due to the growth of output than labour (although in the UK was also the fall of labour).

Table 4.25

Correlation coefficients relating labour productivity growth rates in Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	-0.14 (ns)
1968-74	-0.30 (ns)
1974-78	0.24 (ns)
1978-84	-0.03 (ns)
1963-84	-0.28 (ns)

ns = not significant at the 5 per cent level

source: table 4.24.

Table 4.25 illuminates that there has been a non-significant association relating labour productivity growth rate rankings in both manufacturing industries, during all sub-periods, indicating that Greek and UK industries did not mirror similar patterns of growth.

Across the period 1963-84, the correlation coefficient proved to be insignificant, not surprisingly since the patterns of growth of labour productivity in Greek and UK industries were different. Furthermore, over the same period of time the rise of labour productivity in Greek manufacturing was higher than in the UK indicating that Greek industry has been catching up with the UK in respect of growth of labour productivity.

- *Allocation of employment and productivity*

There are many reasons for differences in productivity growth between countries. One of these is the allocation of employment toward high productivity and away from low productivity sectors. In order to see whether this had any influence in explaining the differences of labour productivity growth between Greek and UK manufacturing industries, the following formula was used devised by Salter[15] and then used by NEDO[4]

$$\frac{\Sigma P_n E_n}{\Sigma P_n E_o} * \frac{\Sigma E_o}{\Sigma E_n} * \frac{\Sigma E_o P_n}{\Sigma E_o P_o}$$

where Σ stands for sum

E stands for employment in each industry

P stands for labour productivity in each industry

0 and n stand for subscripts denoting base and terminal years

This total manufacturing productivity growth is split into two parts. One part comprises the first two components of the formula that measure labour productivity increases due to inter-industry shifts in employment. The last component of the formula measures increases in labour productivity within each industry. The results of the estimation of the formula as a whole and its components can be seen in table 4.26.

Table 4.26

CLASSIFICATION OF AGGREGATE LABOUR PRODUCTIVITY GROWTH BETWEEN THAT ATTRIBUTABLE TO INTER-SECTORAL LABOUR REALLOCATION AND THAT ATTRIBUTABLE TO SECTORAL LABOUR PRODUCTIVITY GROWTH, 1963-84.(1974 PRICES)

	Greece			UK		
	Total growth in labour productivity	Growth attributable to:		Total growth in labour productivity	Growth attributable to:	
Period		Inter-Sectoral Labour Reallocation	Sectoral Labour Productivity Growth		Inter-Sectoral Labour Reallocation	Sectoral Labour Productivity Growth
1963-68	157.6	101.8	154.9	112.6	99.8	112.8
1968-74	150.9	103.1	146.4	122.3	100.2	122.1
1974-78	109.4	98.4	111.2	112.4	100.5	111.8
1978-84	96.7	98.1	98.6	122.8	101.3	121.3
1963-84	223	88	253.4	190.5	102.5	185.9

source: as tables 4.7 and 4.24.

It is obvious from table 4.26 that in both countries the growth in aggregate labour productivity was not due to the restructuring of employment toward high productivity and away from low productivity industries, but due to labour productivity changes within individual industries. Therefore, in this context can be said that Greek and UK industries did enjoy similar development cycles.

High productivity growth can in some sense be explained by high output growth as relatively fast output growth industries will have more opportunities to expand investment and employment. Such industries can, therefore, use the latest techniques of production and enjoy economies of scale. That does not necessarily mean that output growth causes the productivity growth but, still, one would expect a positive association between the two.

Is there, then, any positive relationship between output growth and productivity growth within the Greek and UK manufacturing sectors?

- *Labour productivity, and output*

Table 4.27

Correlation coefficients relating labour productivity growth and output growth in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	0.82 (s)	0.99 (s)
1968-74	0.55 (s)	0.70 (s)
1974-78	0.94 (s)	0.95 (s)
1978-84	0.94 (s)	0.82 (s)
1963-84	0.62 (s)	0.97 (s)

s = significant at 5 % level

source: tables 3.5 and 4.19.

As table 4.27 shows there has been a positive and highly significant association between output growth and labour productivity growth in both Greek and UK manufacturing industries indicating that Greek industry did follow similar development pattern of the UK. This positive and significant association confirms the studies of Wenban-Smith[11,16] for UK manufacturing industry.

The relationship between output growth and labour productivity growth is well known as Verdoorn's law[17] (see also chapter two).

Economicos Tachedromos[9] argued that the big increase of output in Greece, throughout the period examined, was more due to the increase of labour productivity than employment. The findings of tables 3.5, 4.9 and 4.24 point out that, during 1963-84, output increased by 274 % while labour productivity rose by 150 % and labour input by 50 %. That the increase of output was influenced more by the rise of labour productivity than employment can be argued for UK manufacturing industry as well, where labour productivity increased by 90 %, over the period 1963-84, compared with an increase in output of 18 % and decline of 38 % in the labour force.

To sum up, both Greek and UK manufacturing industries experienced similar development patterns since the growth of manufacturing production was more due to the rise of labour productivity than labour force.

(iii) LABOUR COSTS

Competitiveness of a manufacturing industry depends largely on the level of its labour costs and on the industry's labour remuneration per unit of output.

This section will focus on the convergence between the patterns of growth of labour costs in Greek and UK industries.

Both labour costs and unit labour costs of Greek and UK manufacturing industries will be studied and they have been defined at the beginning of this chapter.

Table 4.28

Percentage change of wages and salaries in Greek and UK manufacturing industries, 1963-84 (1974 prices).

Period	Greece	United Kingdom
1963-68	-7.5	13.8
1968-74	-17.6	27.2
1974-78	19.2	6.0
1978-84	13.8	13.0
1963-84	3.4	73.3

source: Greece__ data for the years 1963, 1968 and 1974 was taken from the "Annual Industrial Survey", NSSG; the data for the years 1978 and 1984 was estimated with information collected from the FGI[1]. See also appendix one.

UK __ "Business Monitor", different years

The data of table 4.28 represent the wages and salaries of the Greek and UK manufacturing industries. Table 4.28 shows that during the whole examined period labour costs increased by far more in the UK than in Greece.

During the first two sub-periods, 1963-68 and 1968-74, labour costs decreased in Greece, this is in agreement with other studies.[9] Economicos Tachedromos[9] argues that the money from tourism, shipping and emigrants remittances had allowed labour costs to remain low in Greek industry. At the same time this has not caused stagnation of demand and consumption over this course of time.

Labour costs increased rapidly in Greek manufacturing, between 1974-78, particularly in 1975 and 1976 and these findings correspond to others results.[18] Epilogi[19] mentions that the rise of labour costs contributed to the increase of inflation detected over that period.

In the last sub-period, 1978-84, wages and salaries continued rising, these findings conform with others.[1] According to OECD[20] and FGI[1] the official guidelines supported pay rises even after the second oil crisis, while most OECD countries were restraining labour cost rises. Substantial pay rises were granted in 1982 which, combined with the indexation scheme (ATA) that provided for automatic pay adjustments, led to labour cost increases.

Although table 4.28 exhibits only a 3.4 per cent increase of wages and salaries in Greek manufacturing sector during 1963-84, it is of concern to note the upward trend of labour costs in the last two sub-periods.

Turning to the UK, table 4.28 shows that the fastest growth of labour costs occurred in the sub-period 1968-74.

The devaluation of sterling in November 1967 that influenced prices as well as the subsequent rise of indirect taxes, built up the pressure for pay increases. Furthermore, other factors such as the proximity of the general election of June 1970, encouraged unions to press for earnings rises, that were eventually granted.[21]

Labour costs carried on escalating into the next sub-period as well, in UK manufacturing. In November 1972 a counter-inflation programme was introduced that brought a standstill on pay[22] but pay rises were granted in 1973 and 1974.

After realizing a very rapid increase of labour costs, between 1968 and 1974, the growth of wages and salaries decelerated within the period 1974-78. But labour costs increased rapidly again in 1977 and 1978, a year in which there was a considerable deceleration in inflation rate.[23] However, in the mid-1970s, expansion of labour costs and deceleration of output and productivity growth in the UK, were moderated by the depreciation of the exchange rate.[7]

From 1978 sterling appreciated and labour costs increased in 1979/80.[24] The rise of labour costs decelerated since then, largely due to renewed output and labour productivity growth. Hence, as NEDC[7] argues, the amelioration of output and labour productivity growth since 1980, linked with the reversal of the exchange rate position and the slower growth of labour costs, has improved the competitiveness of the UK manufacturing industry.

Hence, labour costs in UK manufacturing sector were increasing much faster until 1980, than since, and this is in accordance with other studies.[7,25,6]

Although wages and salaries increased more rapidly in Greece than in the UK during the last two sub-periods, it is difficult to say that across the entire period examined, 1963-84, there was tendency of convergence between the two industries since labour costs grew by only 3.4 % in Greece and 73.3 % in the UK.

The value of labour costs in total Greek and UK manufacturing industries was converted into a common currency ($ dollars) and their absolute differences were regressed against time, over the period 1963-84. The equation found is:

The absolute differences between the labour costs in Greek and UK manufacturing industries regressed against time, 1963-84.

$$Y = 1523 + \underset{(2.27)}{29.9\ T} \qquad R^2 = 0.20 \qquad d = 1.47 \qquad (4.5)$$

where Y is the absolute difference between the labour costs in Greek and UK manufacturing industries; T is time representing the period 1963-84; t-statistics can be seen in brackets and t = 2.086 at 5 % level of significance. Source: as table 4.28.

It is apparent from equation 4.5 that there has not been a convergence between Greek and UK manufacturing industries in terms of labour costs.

Table 4.29

Percentage change of labour remuneration per unit of output in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	-43.6	0.5
1968-74	-54.4	18.3
1974-78	-4.9	2.0
1978-84	13.1	21.3
1963-84	-72.4	46.7

source: as tables 3.5 and 4.28.

Table 4.29 illuminates the growth of labour costs per unit of output in the Greek and UK manufacturing industries. Over the whole examined period, unit labour costs increased by 46.4 per cent in the UK, while there has been a decline of 72.4 per cent in Greece.

Examining the different sub-periods, it is apparent that labour remuneration per unit of output declined during 1963-74 in Greek manufacturing industry, this is in accordance with other studies.[9] As wages and salaries (table 4.28) increased but at a lesser extent than output (table 3.5), unit labour costs, in Greece, decreased between 1974 and 1978.

In the last sub-period 1978-84, labour costs increased rapidly in the Greek manufacturing while there has been a deceleration in the growth of output, these findings correspond to others.[26,1] Unit labour costs accelerated, in particular, between 1980 and 1982.[27] Hence, according to OECD[26] and FGI[1], increased unit labour remuneration, controls on prices, second oil crisis, decelerated labour productivity (table 4.24) as well as output, contributed to a decline in profits and investible funds and deteriorated competitiveness, in the last examined sub-period.

Table 4.29 indicates that the labour remuneration per unit of output increased by 46.7 per cent during the whole examined period in UK manufacturing industry.

Unit labour costs grew rapidly in UK manufacturing within the sub-period 1968-74, that was largely due to the fact that the growth of wages and salaries (27.2 %) surpassed the growth of output (8 %). The difference between the acceleration of output and labour costs widened in the 1970s, compared with a low level of increase in the 1960s, these findings conform with others.[24]

Unit labour costs in the UK increased by only 2% between 1974 and 1978, only to rise rapidly again in 1980. It can be said that unit labour costs were increasing much faster between 1963 and 1980/81 than since; this agrees with other studies.[7,24] The deceleration of unit labour costs within 1980-83, was largely the result of the renewed output and productivity growth. Unit labour costs increased slightly in 1984, this is in agreement with other studies.[28,24]

It is apparent from table 4.29 that there has not been a convergence between the two industries in respect of unit labour costs since labour remuneration per unit of output fell by 72.4 % in Greece and increased by 46.7 % in the UK during 1963-84.

D.CONCLUSIONS.

The main purpose of this chapter is the examination of the second hypothesis of this thesis that examines convergence of Greek and UK manufacturing industries in terms of growth of capital and labour inputs, capital intensity, capital and labour productivity as well as labour costs.

During the examined period 1963-84, there has been a similarity of the industrial distribution of capital stock and labour between Greece and the UK, being stronger in terms of capital stock. The absolute differences between the Greek and UK distributions of, firstly, capital stock and then labour input were regressed against time over the period 1963-84. Furthermore, two regression analyses were run against time (1963-84) for total Greek and UK manufacturing industries. The first regression considered whether the differences between the two manufacturing industries narrowed over time in respect of capital stock, while the second regression studied whether the differences diminished in respect of labour force. The findings supported the convergence hypothesis in terms of capital stock as well as labour input over the period 1963-84.

Capital stock was accelerating at a much faster rate in Greece than the UK. In the context of labour force, UK industry had an absolute decline. Hence, during 1963-84 it was found that Greek industry has been catching up with the UK in terms of growth of capital and labour inputs.

The partial correlations between capital stock and labour growth after excluding the influence of output were estimated for both countries. The association between the growth rates of labour and capital after removing the effect of growth of output was found stronger in Greece than in the UK across the entire period examined.

Then, capital intensity "relatives" were estimated (that is capital per employee in an industry as a percentage of capital per employee in total manufacturing) at an aggregate and disaggregate level for both manufacturing industries. The absolute differences between the different Greek and UK manufacturing industries in respect of capital intensity "relatives" were regressed against time. As far as the total Greek and UK manufacturing sectors are concerned, the absolute differences between the two industries in respect of capital to labour ratios were also regressed against time. The findings supported the convergence hypothesis between Greek and UK manufacturing industries in terms of capital intensity across the entire period examined.

Since both labour and capital grew much faster in Greece than in the UK, particularly capital stock, capital intensity was expected to rise faster in Greece as well. Across the entire period examined capital intensity increased over twice as fast in Greek manufacturing than in the UK indicating that Greek industry has been catching up with the UK in respect of growth of capital intensity. During 1963-84, the growth of capital intensity in Greece was the result of faster rise of capital in relation to labour while in the UK was due to the acceleration of capital but also fall of growth of labour.

Capital productivity "relatives" were estimated, at a disaggregate level, for both manufacturing industries. The absolute differences between the output per capital ratios in Greek and UK manufacturing industries were regressed against time. The convergence hypothesis between the total Greek and UK manufacturing industries in respect of capital productivity was sustained over the entire period examined.

Over the period as a whole and the different sub-periods, capital productivity declined in both countries. This is, mainly due to the much faster increase of capital stock than output. Over the entire period examined, the decline of capital productivity appeared to be greater in Greek manufacturing than in the UK. There was found a positive and significant association between output growth and capital productivity growth in Greek and UK manufacturing industries during 1963-84.

Labour productivity "relatives" were estimated, at a disaggregate level, in Greek and UK industries and their absolute differences were studied over time. In total Greek and UK manufacturing industries, the findings found, supported the convergence hypothesis in terms of labour productivity across the entire period examined.

Labour productivity grew in both countries during 1963-84. The rate of growth was found much faster in Greece than in the UK highlighting that Greek industry has been catching up with the UK in respect of labour productivity. There was found a positive and significant relation between output growth and labour productivity growth in both industries between 1963 and 1984.

The aggregate growth of labour productivity in both industries was not explicable in terms of reallocation of employment toward high productivity and away from low productivity sectors but due to labour productivity changes within individual industries.

Wages and salaries rose by far more in the UK than in Greece over the entire period examined, 1963-84, and therefore no sign of convergence was found between the Greek and UK industries in terms of growth of labour costs.

Unit labour costs increased rapidly in the UK during 1963-84 while there has been a decline in Greece and hence there has not been a tendency towards convergence between the two industries as regards the growth of labour remuneration per unit of output.

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CHAPTER FIVE

TOTAL FACTOR PRODUCTIVITY

A. INTRODUCTION

The previous chapter examined capital and labour productivity individually that are measured simply as output/capital and output/labour, respectively, and hence ignore contribution of the omitted factor to changes in output. As Silver[1] notes:

> "Total factor productivity becomes an important concept arising from the inability of partial measures to fully explain growth."

This chapter studies and compares the total factor productivity performance in Greek and UK manufacturing industries. The main purpose being the consideration of the third hypothesis of this thesis that there was a convergence between the patterns of growth in Greek and UK manufacturing industries in terms of total factor productivity during 1963-84. Faster growth of total factor productivity in Greek manufacturing industry in comparison to the UK is anticipated. Furthermore, the differences between the Greek and UK industries in respect of total factor productivity will be expected to diminish over the examined period.

Once the analysis in respect of total factor productivity is completed (having already studied in previous chapters the structure and development of output, labour and capital) it would be possible to show the factors that are the most responsible for the growth of output as well as labour productivity in both countries.

In a sense, total factor productivity growth is an estimate of the gains in the efficiency of production, that is, it can be taken as a measure of technological development.

Different approaches for the estimation of productivity and, in particular, of total factor productivity have been discussed in the literature review chapter. Here total factor productivity is estimated according to NEDO[2] as well as Todd's[3] model.

The structure of this chapter is as follows:

B. Methodology and data.

- the approach

C. Estimation of the rate of return on capital, r, share of labour, α, and share of capital, β, at the base year 1974.

D. Growth of total factor productivity.

E. Growth of total factor productivity and partial productivities.

F. Contributions to growth of gross domestic product.

G. Contributions to growth of labour productivity.

H. Conclusions.

I. References.

B. METHODOLOGY AND DATA.

The Approach

The measurement of total factor productivity will follow Nedo's and Todd's patterns.

According to NEDO, total factor productivity is defined as follows:

$$P = Y / (\alpha L + \beta K) \qquad (1)$$

where P is an index of total factor productivity, Y is an index of output, L is an index of labour, K is an index of capital, and α and β are their respective weights, summing to unity.

The labour and capital shares are defined in NEDO as:

$$\alpha = \frac{w_0 L_0}{w_0 L_0 + r_0 K_0} \qquad (2) \quad \text{and}$$

$$\beta = \frac{r_0 K_0}{w_0 L_0 + r_0 K_0} \qquad (3)$$

where α is labour share, β is capital share, w denotes wages; L labour; K capital stock; r return on capital; and, 0 being the base year.

Todd's pattern is set in a growth accounting framework and emphasises the relative contributions of factor inputs to total output growth with reference to a base year. Todd[3] adds:

> "Any differences or 'residual' factors not accounted for are usually referred to as total factor productivity. This can be expressed in numerous ways as is well known..."

Hence:

$$TFPg = Vg - TFIg \qquad (4)$$

$$TFIg = \alpha\, Lg + (1 - \alpha)\, Kg \qquad (5)$$

Therefore

$$TFPg = Vg - Kg - \alpha\, (Lg - Kg) \qquad (6)$$

or alternatively

$$TFPg = Vg - Lg - \beta\, (Kg - Lg) \qquad (7)$$

where $TFPg$ = growth of total factor productivity

$TFIg$ = growth of total factor input

Vg = growth of output

Lg = growth of labour input

Kg = growth of capital input

α = labour share

β = capital share

Todd's model used Solow's[4] measure based on the Cobb-Douglas production function with constant returns to scale and autonomous and neutral technological change.

In this chapter the estimation of growth of total factor productivity will be based on equations (1) and (4). Output is defined as gross domestic product, labour input as number of persons employed and capital input as gross fixed capital stock. Labour and capital shares are calculated according to equations (2) and (3).

The base year for the estimation of factor shares was decided to be 1974 (see also chapter 1), the grounds for this choice being :

1. It is roughly the mid-point of the period under consideration;

2. It was a fairly " normal " year for both countries in terms of output (chapter 3) and productivity (chapter 4);

3. Not all the data required for the estimation of the rate of return on capital and therefore shares of labour and capital for Greek industry for the years prior to 1974 was available.

In order to study the convergence hypothesis in terms of growth of total factor productivity it is necessary to estimate first the rate of return on capital and the shares of labour and capital on output.

C. ESTIMATION OF THE RATE OF RETURN ON CAPITAL, r, SHARE OF LABOUR, Sw, AND SHARE OF CAPITAL, $S\pi$, AT THE BASE YEAR 1974.

The rate of return on capital is estimated using equation (8) which is thought by Walker[5] as the best method when considering the profitability of individual industries and is the approach adapted by the Quarterly Bulletin of Bank of England[6].

$$r = (\text{gross trading profits} + \text{rent} - \text{capital consumption} - \text{stock appreciation}) / (\text{net capital stock} + \text{stocks and work in progress}) \quad (8)$$

The data for the UK for the estimation of r was taken from the Business Monitor Series M3, Company Finance. For Greece most of the data was taken from the State of Greek Industry[7], apart from the data on stocks for the year 1973, that was obtained from Koutsoumaris[8] and for the year 1974, that was supplied by the Federation of Greek Industries (FGI).

Table 5.1

Return on capital in 1974 (%)

	Greece	United Kingdom
Food	14.6	5.2
Beverages	24.5	5.2
Tobacco	-0.6	2.4
Textiles	13.9	6.0
Footw-Wearing	26.6	6.3
Wood-Cork	8.9	15.6
Furniture	27.0	16.2
Paper	12.0	7.0
Print.-Publ.	58.1	7.1
Leather-Fur	22.9	11.9
Rubber-Plastics	32.7	3.7
Chemicals	22.9	6.9
Petrol and Prod.	10.7	3.9
Non Metallic Min.	13.7	3.5
Basic Metal Ind.	4.8	1.1
Metal Products	9.5	4.3
Machinery	22.4	2.2
Electrical	13.3	2.2
Transport Equip.	5.3	-6.1
Miscellaneous	22.5	4.9
Total	14.2	4.0

source: UK__M3 Business Monitor, Company Finance, 9th issue.

Gr__The State of Greek Industry in 1975[7]; Koutsoumaris[8]; stocks for the year 1974 were supplied by the FGI.

Table 5.1 shows the profit return on capital in the base year 1974 for Greece and the UK. The rate of return on capital for the whole UK manufacturing industry was estimated as 4 per cent, which is consistent with figures given in Bank of England Quarterly Bulletin.[6,9]

For the total Greek manufacturing industry the return on capital was found to be 14.2 per cent. Other studies such as the "State of Greek Industry"[7] (ed. 1978), record that the return on capital in 1974 was 12.7 per cent. This slight discrepancy is due to different ways of estimating profitability; return on capital according to the "State of Greek Industry" was calculated not as equation (8) but as the ratio of net profits plus depreciation, plus financing expenses to total funds (that is borrowed and own funds).

As table 5.1 indicates, the return on capital of the whole Greek manufacturing industry was over triple that realized in the UK in the base year 1974, leading to the faster increase of investment in Greece than in the UK (see appendix two).

Looking at the different Greek manufacturing sectors the industries that realized the highest rates of return on capital were printing and publishing, rubber and plastics, furniture and fixtures, footwear and wearing, and beverages. For the UK the equivalent industries were furniture and fixtures, wood and cork, leather, printing and publishing, and paper and products.

The industries that enjoyed among the highest profitability rates in both countries were printing and publishing, and furniture and fixtures. The tobacco industries experienced a loss in Greece in 1974 and at the same time transport equipment industries realized a negative return on capital in the UK.

Having estimated the rate of return on capital for Greek and UK manufacturing industries, the calculation of shares of labour (α) and capital (β) on output follows, for both industries, based on equations (2) and (3).

Although NEDO and Todd assumed that there are constant returns to scale (i.e. $\alpha + \beta = 1$), the shares of labour and capital have been estimated independently. It was only the tobacco industries for Greece and transport equipment industries for the UK (table 5.2) that had labour shares slightly exceeding one, largely due to negative returns on capital (see table 5.1). But as constant returns to scale have been assumed their labour shares will be considered as equal to one and their capital shares equal to zero.

Table 5.2

Factor Shares in Greek and UK Manufacturing Industries in 1974.

	GR (α)	UK (α)	GR (β)	UK (β)
Food	0.68	0.76	0.32	0.24
Beverages	0.38	0.63	0.62	0.37
Tobacco	1.00	0.90	0.00	0.10
Textiles	0.60	0.76	0.40	0.24
Footw.-Wearing	0.86	0.86	0.14	0.14
Wood-Cork	0.80	0.72	0.20	0.28
Furniture	0.79	0.70	0.21	0.30
Paper	0.49	0.72	0.51	0.28
Print.-Publ.	0.55	0.81	0.45	0.19
Leather-Fur	0.82	0.65	0.18	0.35
Rub.-Plastics	0.45	0.82	0.55	0.18
Chemicals	0.34	0.53	0.66	0.47
Petrol and Pr.	0.30	0.70	0.70	0.30
Non Metal.Min.	0.49	0.83	0.51	0.17
Basic Metals	0.60	0.92	0.40	0.08
Metal Products	0.72	0.84	0.28	0.16
Machinery	0.78	0.93	0.22	0.07
Electrical	0.71	0.93	0.29	0.07
Transport Eq.	0.87	1.00	0.13	0.00
Miscellaneous	0.77	0.78	0.23	0.22
Total	0.60	0.83	0.40	0.17

source: based on the same sources of data as tables 4.3, 4.7, 4.28 and 5.1.

Table 5.2 shows that for most manufacturing industries in Greece and the UK the labour share on output (i.e. α) was much higher than the capital share on output (i.e. β).

In Greece the industries that realized the greatest labour shares on output in 1974 were tobacco manufactures, transport equipment, footwear and wearing, leather, and wood and cork. For the UK the equivalent industries were transport equipment, machinery, electrical, basic metals, and tobacco. It is obvious that for both countries the industries that enjoyed among the highest labour shares were tobacco manufactures and transport equipment.

The industries with the highest capital shares on output for Greece were petrol and products, chemicals, and beverages. For the UK these industries were chemicals, beverages, and leather. Hence, the industries in both countries that experienced among the highest capital shares were chemicals and beverages.

Having estimated r, α and β, for both countries in base year 1974, the calculation of growth of total factor productivity according to equations (1) and (4) can be carried out.

Table 5.3

PERCENTAGE CHANGE OF TOTAL FACTOR PRODUCTIVITY IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. NEDO'S APPROACH.

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	39	12	13	29	19	17	-9	16	69	96
Beverages	47	14	33	-4	25	18	-3	-4	136	23
Tobacco	49	-4	13	-12	24	17	-22	23	63	22
Textiles	56	19	22	6	-0.1	-1	16	-3	119	21
Footw. Wear.	39	9	37	27	-6	8	-13	18	55	77
Wood-Cork	47	409	29	52	16	-10	-17	-9	82	534
Furniture	92	-53	2	16	-8	17	-53	-6	-15	-40
Paper-Prod.	16	25	39	7	-37	2	45	26	46	72
Print. Publ.	11	15	17	3	7	20	33	15	84	65
Leather	57	12	18	17	-47	-1	-28	96	-29	154
Rub. Plastics	14	12	46	4	-13	15	-5	30	38	74
Chemicals	9	1	68	-2	0.5	11	1	25	86	37
Petrol-Prod.	-33	26	-51	71	2	18	2	122	-66	464
Non Met. Min.	43	1	10	19	10	28	1	-45	73	-15
Basic Metals	73	-5	89	40	-12	-17	5	13	202	26
Metal Prod.	29	8	30	6	-9	10	16	5	76	33
Machinery	28	23	21	13	-12	20	-42	7	-21	78
Electrical	39	4	-5	19	-18	15	9	20	18	73
Transport Eq.	13	15	60	17	-19	5	-11	25	30	75
Miscellaneous	78	15	51	14	9	7	-15	31	147	84
Total	31	10	27	15	-1	10	-4	16	56	63

Source: as tables 3.2, 4.1, 4.7 and 5.2.

Table 5.4

PERCENTAGE CHANGE OF TOTAL FACTOR PRODUCTIVITY IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84. TODD'S APPROACH.

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	36.8	10	6	26	23.6	15.5	-10	17	72	81
Beverages	48	7	28	-17.4	30.8	18	-4	-4	251	-13
Tobacco	38	-5.7	10	-12	26	16	-23	18	41.4	-2
Textiles	47.3	14.6	19	2.8	-0.2	-1	11	-2	140	0.1
Footw. Wear.	26	7.5	7	20.4	-9	7	-14.6	14.4	-182	38.1
Wood-Cork	-31	432	13	38	17.6	-10.5	-16.9	-8	-280	430
Furniture	82	-64	-20	9	-11	16	-52	-4.3	-214	-56
Paper-Prod.	4	23	42	6	-57.7	2	39	21	52	48
Print. Publ.	-120	16	0.1	0.7	8.6	19	40	16	-516	58
Leather	53	9.4	21	6.7	-73	-1	-30	54	-66	60.8
Rub. Plastics	2	6	76	2	-20	12.5	-4.3	25.8	43	50
Chemicals	-1	-3.5	89	-7	1	11	0.7	23.6	241	23
Petrol-Prod.	-982	23.2	-258	47	2	22	2	118	-5483	414
Non Met. Min.	17	1	-4	5	12	24	1.3	-37	-39	-23
Basic Metals	105	-5	136	34	-13	-17	5	7	878	6
Metal Prod.	-9.4	8	32	5.9	-11	9.3	19	4.7	-84	52
Machinery	8	23	27	9.4	-15	18	-47	8.1	-158	56
Electrical	38.5	5	-29	17	-22.2	13.8	5.2	18	-53	57
Transport Eq.	7	12	114	17	-27	5.1	-12	15	18	39.6
Miscellaneous	78	15	55	10.4	12	6.5	-19	24	175	56
Total	10	9	29	12	-1.8	10	-3.8	13	2	38

Source: as tables 3.2, 4.1, 4.7 and 5.2.

D. GROWTH OF TOTAL FACTOR PRODUCTIVITY

Using equation (1) the growth of total factor productivity was estimated and the findings can be seen in table 5.3. Furthermore, the growth of total factor productivity was calculated according to equation (4) and the results are seen in table 5.4.

It is apparent from tables 5.3 and 5.4 that total factor productivity of the Greek manufacturing industry was increasing at a fast rate until 1974 and since then its performance deteriorated indicating loss of efficiency of production and technological progress.[10] The decrease of growth of TFP in Greek industry during 1974-78 and 1978-84 was due to faster growth of capital and labour than production itself (see also tables 5.12 and 5.13). Over the entire period examined TFP of total Greek manufacturing increased not as fast as the UK.

Total factor productivity of UK manufacturing industry grew rapidly until 1974. It decelerated between 1974 and 1978 and rose again between 1978 and 1984. But the increase of TFP of UK industry, during 1978-84, was due to greater decrease of percentage change of labour and capital together, in comparison to production (see also table 5.13), so it cannot really be argued that there has been a real improvement of technological progress in the UK over this period of time.

Tables 5.3 and 5.4 show that TFP in both manufacturing sectors rose between 1963 and 1974 (Greece's pattern of growth being greater than the UK) but since then the growth of TFP decreased in Greece while it slightly decelerated in the UK during 1974-78 and grew again between 1978 and 1984. Therefore, there was a tendency of convergence between the patterns of growth of total factor productivity in Greek and UK manufacturing industries over the first two sub-periods but not since then. Looking at the entire period examined, 1963-84, the growth of TFP rose faster in the UK than in Greece and therefore it cannot be said that there was a convergence between the Greek and UK manufacturing industries in terms of growth of total factor productivity.

The findings of tables 5.3 and 5.4 give similar results for total UK manufacturing industry over different sub-periods. The results seen in tables 5.3 and 5.4 for total Greek industry are quite similar for all sub-periods except the first. Across the entire period examined, 1963-84, the results found following NEDO's model (table 5.3) are much higher than those following Todd's model (table 5.4) and therefore NEDO's model is apparently preferable. However, for this dissertation the advantage of pursuing Todd's method of estimation of TFP growth, is because it allows consideration of the contributors to growth of output. This would not have been possible following NEDO's model due to the non-availability of annual data for UK manufacturing industry, at a disaggregate level, in respect of gross domestic product for the years 1964-67 and 1969 (see also explanations later on in this chapter).

Turning to different manufacturing sectors, tables 5.3 and 5.4 show that the industries that realized the highest growth rates in Greece during the whole examined period were basic metals, beverages, chemicals, miscellaneous and textiles. Over the same period of time, the Greek industry with the worst negative total factor productivity growth rate was petrol and products, largely due to faster increase of capital stock (see table 4.3) as well as labour (see table 4.9) in relation to output (see table 3.5).

Tables 5.3 and 5.4 show that in the UK, the industries with the highest growth rates of total factor productivity, during 1963-84, were wood and cork industries, petrol and products, food and leather and fur. The industry with the worst negative growth of TFP in the UK, over the same period of time, was furniture and fixtures.

Across the period 1963-84, the patterns of growth of total factor productivity of the various manufacturing sectors were at variance for the two countries confirming what has already been said that there has not been a convergence between the Greek and UK industries in respect of growth of total factor productivity.

Table 5.5

THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK INDICES OF TOTAL FACTOR PRODUCTIVITY REGRESSED AGAINST TIME, 1970-84, (1974 CONSTANT PRICES).

Food	Y = 0.02 + 0.01 T	(1.95)	R^2 = 0.23, d = 1.37
Beverages	Y = 0.17 - 0.006T	(-0.91)	R^2 = 0.06, d = 1.52
Tobacco	Y = 0.23 - 0.001T	(-0.10)	R^2 = 0.001, d = 1.88
Textiles	Y = 0.02 + 0.01 T	(2.58)	R^2 = 0.34, d = 1.43
Footw. Wear.	Y = -0.08 + 0.03 T	(6.17)	R^2 = 0.74, d = 1.39
Wood-Cork	Y = 0.11 + 0.01 T	(1.23)	R^2 = 0.10, d = 1.49
Furniture	Y = -0.07 + 0.05 T	(7.39)	R^2 = 0.81, d = 1.50
Paper-Prod.	Y = 0.27 - 0.002T	(-0.25)	R^2 = 0.005, d = 1.49
Print. Publ.	Y = 0.14 - 0.007T	(-1.58)	R^2 = 0.16, d = 2.44
Leather	Y = -0.27 + 0.12 T	(7.64)	R^2 = 0.82, d = 1.40
Rub. Plastics	Y = -0.02 + 0.04 T	(6.01)	R^2 = 0.73, d = 1.42
Chemicals	Y = 0.04 + 0.01 T	(3.03)	R^2 = 0.41, d = 1.47
Petrol-Prod.	Y = 0.25 + 0.06 T	(2.26)	R^2 = 0.28, d = 1.44
Non Met. Min.	Y = 0.04 + 0.03 T	(2.91)	R^2 = 0.39, d = 1.45
Basic Metals	Y = 0.09 + 0.002T	(0.40)	R^2 = 0.01, d = 2.43
Metal Prod.	Y = 0.07 + 0.007T	(1.44)	R^2 = 0.14, d = 2.33
Machinery	Y = 0.01 + 0.04 T	(4.70)	R^2 = 0.63, d = 1.49
Electrical	Y = 0.11 + 0.02 T	(2.83)	R^2 = 0.38, d = 1.38
Transport Eq.	Y = -0.01 + 0.03 T	(4.17)	R^2 = 0.57, d = 1.95
Miscellaneous	Y = 0.05 + 0.01 T	(1.51)	R^2 = 0.15, d = 1.54

where Y is the absolute difference between the Greek and UK indices of total factor productivity; T is time, representing the period 1963-84; t-statistics are in brackets and t = 1.350 at 10 % level, t = 1.771 at 5 % level and t = 2.160 at 5 % level, a two-tail test. Source: as table 5.3.

It has already been demonstrated in tables 5.3 and 5.4 that the convergence hypothesis was rejected in respect of growth of total factor productivity during 1963-84. In order to be absolutely certain about the findings, the differences between the Greek and UK manufacturing industries in respect of total factor productivity were studied over time. It is apparent that this analysis could only be done following NEDO's model (equation 1) and not Todd's (equation 4) whose analysis is set in a growth accounting framework.

Table 5.5 shows the findings from regression analyses between the absolute differences of total factor productivity indices in Greek and UK manufacturing industries and time. Due to lack of disaggregate data in respect of gross domestic product in UK manufacturing industry for the years 1964-67 and 1969, the regressions could only be studied for the period 1970-84. Hence, the changes that occurred in both manufacturing industries, at a disaggregate level, between 1963 and 1969 are not considered.

It is apparent from table 5.5 that only in the case of printing and publishing industry the coefficient in time "b" was proven to be negative and significant (only at 10 % level). Time proved to have had an insignificant impact on diminishing the differences between the Greek and UK total factor productivities in beverages, tobacco, wood and cork, paper and products, and basic metals. For the rest of the industries the absolute differences between the Greek and UK total factor productivities increased instead of diminishing, across the period 1970-84.

Since aggregate figures exist in respect of output for UK industry, it was possible to estimate the total factor productivity indices for both manufacturing industries, find their absolute differences and study them over the period 1963-84. The equation found is as follows:

The absolute differences between the Greek and UK total factor productivity indices regressed against time, 1963-84.

$$Y = 0.09 + \underset{(0.66)}{0.002}\,T \qquad R^2 = 0.11 \qquad d = 1.49 \qquad (5.1)$$

where Y is the absolute difference between the Greek and UK total factor productivity indices; T is time representing the period 1963-84; t-statistics can be seen in brackets and $t = 2.086$ at 5 % level of significance, a two-tail test.
Source: as table 5.3.

It is apparent from the above equation that time had an insignificant impact on diminishing the differences between the two manufacturing industries in respect of total factor productivity across the period 1963-84.

If the above regression analysis is repeated for the period 1963-81, the equation found is:

The absolute differences between the Greek and UK total factor productivity indices regressed against time, 1963-81.

$$Y = 0.15 - 0.01\,T \qquad R^2 = 0.40 \qquad (5.2)$$
$$(-3.39) \qquad d = 1.73$$

where Y is the absolute difference between the Greek and UK total factor productivity indices; T is time representing the period 1963-81; t-statistics can be seen in brackets and $t = 2.110$ at 5 % level of significance, a two-tail test.

Source: as table 5.3.

It is apparent from equation 5.2 that there has been a convergence between Greek and UK manufacturing industries in respect of total factor productivity across the period 1963-81. The differences between the Greek and UK industries in terms of TFP did not continue diminishing between 1982 and 1984. This was due to fall of total factor productivity in Greek industry owed to faster growth of labour and capital in relation to output.

To examine the factors that contributed most to the growth of output in Greek and UK manufacturing industries only Todd's model will be used. NEDO's model (see equation 4 in appendix three) requires annual data that was not available for UK manufacturing industry, at a disaggregate level, in respect of gross domestic product for the years 1964-67 and 1969 (therefore the contributors to growth of output in UK manufacturing, at a disaggregate level, could not be studied for the period 1963-69).

At first the association between total factor productivities in Greek and UK manufacturing industries as well as total factor productivity and partial productivities will be studied considering TFP according to Todd's pattern.

E. GROWTH OF TOTAL FACTOR PRODUCTIVITY AND PARTIAL PRODUCTIVITIES

Table 5.6

Correlation coefficients relating total factor productivity growth rates in Greece and the UK, 1963-84.

Period	Correlation Coefficients
1963-68	-0.06 (ns)
1968-74	-0.38 (s)
1974-78	0.33 (ns)
1978-84	0.04 (ns)
1963-84	-0.68 (s)

s = significant at the 5 per cent level

ns= not significant at the 5 per cent level

Source: table 5.4.

Table 5.6 illuminates the fact that over the different sub-periods there has not been a great similarity between the patterns of TFP growth of the two industries as the correlation coefficients indicate by being very low (during 1968-74) or insignificant (during the rest of sub-periods).

Over the entire period examined the association was significant but negative, indicating that the patterns of growth of TFP of Greek and UK industries were moving towards different directions. This is reinforcing what has already been said that, during 1963-84, there has not been a convergence between the patterns of growth in Greek and UK industries in terms of TFP.

One might expect that manufacturing sectors realizing high growth rates of total factor productivity would also function well in terms of partial productivity measures, that is labour and capital productivity. Following NEDO's[2] model, relationships between the growth of total factor productivity and partial productivities will be tested.

Table 5.7

Correlation coefficients relating the growth of total factor productivity and the growth of labour productivity in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	0.45 (s)	0.99 (s)
1968-74	0.73 (s)	0.82 (s)
1974-78	0.86 (s)	0.95 (s)
1978-84	0.98 (s)	0.97 (s)
1963-84	0.38 (s)	0.98 (s)

s = significant at the 5 per cent level

source: tables 4.24 and 5.4.

The association between total factor productivity and labour productivity growth rates in both manufacturing industries is examined in table 5.7.

Table 5.7 shows that there is a positive and significant relation between the growth rates of total factor productivity and labour productivity in Greece and the UK (the association being stronger in the UK) indicating similarity of their patterns of growth.

In Greece the correlation coefficient was not very high across the period 1963-84 not surprisingly, since over this period of time total factor productivity increased by 2 per cent (table 5.4) while labour productivity grew by 150 per cent (table 4.24).

Table 5.8

Correlation coefficients relating the growth of total factor productivity and the growth of capital productivity in Greek and UK manufacturing industries, 1963-84.

Period	Greece	United Kingdom
1963-68	0.61 (s)	0.99 (s)
1968-74	0.67 (s)	0.75 (s)
1974-78	0.72 (s)	0.75 (s)
1978-84	0.84 (s)	0.83 (s)
1963-84	0.44 (s)	0.94 (s)

s = significant at the 5 per cent level

source: tables 4.19 and 5.4.

The relation between growth rates of total factor productivity and capital productivity for Greece and the UK can be seen in table 5.8. It is apparent that there is a positive association between changes of total factor productivity and capital productivity in both industries. During all sub-periods and the entire period examined this association proved to be stronger in the UK than in Greece, indicating more similar patterns of growth between total factor productivity and capital productivity.

Tables 5.7 and 5.8 highlight that there was a positive and significant association between total factor productivity growth and partial productivities in both manufacturing industries over the entire period examined, the association being stronger in the UK.

Table 5.9 sets out the sectoral rankings by size in terms of growth of total factor productivity, labour productivity and capital productivity in Greece and the UK across the period 1963-84.

Table 5.9

Sectoral rankings in terms of growth of total factor productivity (TFP), labour productivity (LP) and capital (CP) productivity

	Greece(1963-84)			United Kingdom(1963-84)		
	TFP	LP	CP	TFP	LP	CP
Food	6	10	7	3	4	4
Beverages	2	1	3	17	13	14
Tobacco	9	14	14	16	16	19
Textiles	5	6	4	15	15	15
Footw.-Wear.	16	13	19	12	9	10
Wood-Cork	18	11	18	1	1	1
Furniture	17	17	17	19	20	18
Paper	7	12	5	10	6	6
Printing	19	2	15	5	10	7
Leather-Fur	13	20	10	4	3	3
Rub-Plastics	8	9	6	9	5	13
Chemicals	3	8	2	13	8	9
Petrol and Pr.	20	19	20	2	2	2
Non Metal.Min.	11	5	8	18	19	17
Basic Metals	1	3	1	14	18	16
Metal Products	14	7	13	8	17	12
Machinery	15	18	16	7	11	9
Electrical	12	16	11	6	12	8
Transport Eq.	10	15	12	11	14	11
Miscellaneous	4	4	9	7	7	5

source: tables 4.19, 4.24 and 5.4.

Table 5.9 shows that in Greece the industries that had among the highest growth rates in terms of total factor productivity, labour productivity and capital productivity were basic metal industries, beverages, textiles, chemicals, and, miscellaneous during the period 1963-84. In the UK the equivalent industries were wood and cork, petrol and products, leather and fur, food, and, miscellaneous.

There was not a great resemblance in terms of rankings between Greece and the UK over the period 1963-84 indicating that Greek and UK industries did not pursue similar patterns of growth in terms of TFP, LP and CP. Industries that had among the highest rankings in Greece had among the lowest in the UK and the other way around.

F. CONTRIBUTIONS TO GROWTH OF GROSS DOMESTIC PRODUCT

This section will examine, following equation (4), whether the growth of TFP, capital share or labour share contributed most to the growth of gross domestic product in both industries.

It is apparent from equation (4) that the growth of output would equal the sum of the growth of TFP and total factor input (labour and capital shares on output).

Table 5.10

CONTRIBUTIONS TO GROWTH OF GROSS DOMESTIC PRODUCT IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-68, (%).

	GREECE				UNITED KINGDOM			
	V	SwL	SπK	TFP	V	SwL	SπK	TFP
Food	46	-0.1	9.3	36.8	16	1	5	10
Beverages	102	7	47	48	19	-1	13	7
Tobacco	12	-26	0	38	-4.7	-4	5	-5.7
Textiles	70	-0.5	23.2	47.3	8.4	-8.4	2.2	14.6
Footw. Wear.	44	1	17	26	1.2	-7.7	1.4	7.5
Wood-Cork	54	-1	86	-31	435	5	-2	432
Furniture	123	9	32	82	-45	11	8	-64
Paper-Prod.	82	14	64	4	27	-1	5	23
Print. Publ.	46	2	164	-120	24	5	3	16
Leather	55	-5	7	53	3.3	-5.8	-0.3	9.4
Rub. Plastics	99	14	83	2	41	15	20	6
Chemicals	104	9	96	-1	8.1	-1.6	13.2	-3.5
Petrol-Prod.	53	8	1027	-982	48	1.4	23.4	23.2
Non Met. Min.	80	2	61	17	5	3	1	1
Basic Metals	297	41	151	105	-6.2	-1.8	0.6	-5
Metal Prod.	50	-0.2	59.6	-9.4	13	3	2	8
Machinery	64	12	44	8	31	7	1	23
Electrical	105	29.1	37.4	38.5	15	9	1	5
Transport Eq.	15	-1	9	7	3.6	-8.4	0	12
Miscellaneous	99	6	15	78	24	6	3	15
Total	64	2	52	10	13	1	3	9

where V = growth of output; SwL = growth of labour share; SπK = growth of capital share; TFP = growth of total factor productivity. Source: as tables 3.2, 4.1, 4.7 and 5.2.

Table 5.10 shows the contributions to growth of gross domestic product (GDP) in both manufacturing industries during 1963-68.

In Greece, the main contribution to growth of GDP of total manufacturing industry was the growth of capital. In industries such as wood and cork, printing and publishing, petrol and products, and metal products, the growth of capital ($S\pi K$) outstripped that of output as well as labour so that influenced negatively the growth of their TFP. The second contributor to the growth of output of total Greek manufacturing, after capital, was the growth of the residual.

In the UK, the picture is very different to that of Greece over the same period of time, 1963-68. The main contributor to the growth of GDP of total UK manufacturing industry and most individual industries was the growth of TFP. Only in beverages, rubber and plastics, and petrol and products, the contribution of capital to growth of output was greater than that of TFP. The second most important contribution to the growth of GDP was largely the growth of capital.

Therefore, over the first sub-period Greek and UK industries did not reflect similar growth cycle since the main contributor to growth of output was the growth of share of capital in Greece and growth of TFP in the UK.

Table 5.11

CONTRIBUTIONS TO GROWTH OF GROSS DOMESTIC PRODUCT IN GREEK AND UK MANUFACTURING INDUSTRIES, 1968-74, (%).

	GREECE				UNITED KINGDOM			
	V	SwL	$S\pi K$	TFP	V	SwL	$S\pi K$	TFP
Food	49	9	34	6	29	-6	9	26
Beverages	82	-2	56	28	-1.1	-10.7	27	-17.4
Tobacco	-12	-22	0	10	-21	-12	3	-12
Textiles	89	16	54	19	-9.6	-16.7	4.3	2.8
Footw. Wear.	48	-3	44	7	8.4	-15.5	3.5	20.4
Wood-Cork	78	16	49	13	35	-16	13	38
Furniture	30	8	42	-20	17	-9	17	9
Paper-Prod.	67	0.5	24.5	42	14	-2	10	6
Print. Publ.	71	6.1	64.8	0.1	-5.1	-10.5	4.7	0.7
Leather	39	16	2	21	4.2	-16.9	14.4	6.7
Rub. Plastics	157	23	58	76	16	4	10	2
Chemicals	121	13	19	89	11	-1	19	-7
Petrol-Prod.	80	33	305	-258	15	-22	-10	47
Non Met. Min.	67	6	65	-4	11	-14	20	5
Basic Metals	196	48	12	136	24	-13	3	34
Metal Prod.	87	20	35	32	9.9	0	4	5.9
Machinery	81	30	24	27	-7.3	-18.6	1.9	9.4
Electrical	80	40	69	-29	11	-9	3	17
Transport Eq.	212	72	26	114	12	-5	0	17
Miscellaneous	119	19	45	55	7.5	-10.2	7.3	10.4
Total	81	13	39	29	8	-10	6	12

where V = growth of output, SwL = growth of labour share, $S\pi K$ = growth of capital share, TFP = growth of total factor productivity. Source: as tables 3.2, 4.1, 4.7 and 5.2.

Table 5.11 shows the contributions to growth of gross domestic product in both Greek and UK manufacturing industries across the sub-period 1968-74.

The most important contributor to growth of output in total Greek manufacturing was firstly the growth of capital and then the growth of total factor productivity.

Over this period which realized the fastest growth of gross domestic product of the Greek manufacturing industry, the importance of technical change and its contribution to growth of output increased. There were industries which importance of TFP growth to output surpassed that of capital and they were the following: tobacco, paper and products, leather and fur, rubber and plastics, chemicals, basic metals, machinery and appliances, transport equipment and miscellaneous. Furthermore, there was a negative labour contribution to growth of output in the case of beverages, tobacco, and, footwear and wearing.

Turning to the UK, over the same period of time, it was the growth of TFP that contributed most to the growth of GDP. The contribution of capital was greater though, in the case of the industries: beverages, textiles, furniture and fixtures, paper and products, printing and publishing, leather and fur, rubber and plastics, chemicals, and non-metallic minerals. The contribution of growth of labour to output was negative for all UK manufacturing industries (except rubber and plastics) resulting from the fall in employment (see table 4.9).

Hence, Greek and UK industries did not pursue similar patterns of growth for the same reasons as in the previous period 1963-68.

Table 5.12

CONTRIBUTIONS TO GROWTH OF GROSS DOMESTIC PRODUCT IN GREEK AND UK MANUFACTURING INDUSTRIES, 1974-78, (%).

	GREECE				UNITED KINGDOM			
	V	SwL	SπK	TFP	V	SwL	SπK	TFP
Food	45	-0.1	21.5	23.6	9.9	-6.8	1.2	15.5
Beverages	56	-0.2	25.4	30.8	17	-3	2	18
Tobacco	35	9	0	26	11	-6	1	16
Textiles	33	7.2	26	-0.2	-12	-12	1	-1
Footw. Wear.	33	24	18	-9	-2.6	-9.5	-0.1	7
Wood-Cork	29	5.6	5.8	17.6	-9.1	-3.6	5	-10.5
Furniture	28	21	18	-11	11	-7	2	16
Paper-Prod.	-4.3	16.2	37.2	-57.7	-7.1	-9.4	0.3	2
Print. Publ.	35	6.6	19.8	8.6	17	-4	2	19
Leather	-18	39	16	-73	-12	-8	-3	-1
Rub. Plastics	33	11	42	-20	7.5	-7.4	2.4	12.5
Chemicals	19	7	11	1	15	1	3	11
Petrol-Prod.	-5	6	-13	2	42	0	20	22
Non Met. Min.	43	2	29	12	12	-10	-2	24
Basic Metals	-1.8	6	5.2	-13	-24	-8	1	-17
Metal Prod.	11	7	15	-11	3.9	-5.8	0.4	9.3
Machinery	12	7	20	-15	14	-4.5	0.5	18
Electrical	-1.2	6	15	-22.2	4.8	-9.3	0.3	13.8
Transport Eq.	15	30	12	-27	1.1	-4	0	5.1
Miscellaneous	51	1	38	12	2.8	-3.9	0.2	6.5
Total	25	8.4	18.4	-1.8	4	-7	1	10

where V = growth of output; SwL = growth of labour share; SπK = growth of capital share; TFP = growth of total factor productivity.Source: as tables 3.2, 4.1, 4.7 and 5.2.

Table 5.12 exhibits the contributions to growth of GDP in Greek and UK manufacturing industries during the third sub-period 1974-78.

Over this period of time, as in the previous sub-periods, the most important contributor to growth of GDP in Greece was capital. But the second most important this time was labour instead of TFP. The growth of labour contributed more than capital to growth of GDP in the following industries: tobacco, footwear and wearing, furniture and fixtures, leather and fur, and transport equipment. The significance of growth of TFP to growth of output was negative for total Greek manufacturing industry and many different industries as the growth of capital stock and labour input surpassed that of output that was negatively influenced by the first oil crisis. The deterioration of TFP growth indicates a loss of efficiency of production.

In the UK TFP growth was the first most significant contributor to the growth GDP followed by capital growth; this is in agreement with other studies.[11] The contribution of labour was largely negative except in the case of chemicals due to fall in employment.

Across the period 1974-78 Greek and UK industries did not witness similar development pattern since the main contributor to growth of output was the growth of capital share in Greece and the growth of TFP in the UK.

Table 5.13

CONTRIBUTIONS TO GROWTH OF GROSS DOMESTIC PRODUCT IN GREEK AND UK MANUFACTURING INDUSTRIES, 1978-84, (%).

	GREECE				UNITED KINGDOM			
	V	SwL	SπK	TFP	V	SwL	SπK	TFP
Food	-5.9	4	0.1	-10	13	-5	1	17
Beverages	10	4	10	-4	-15	-10	-1	-4
Tobacco	-18	5	0	-23	-11	-35	6	18
Textiles	-9.6	-9.6	-11	11	-44	-38	-4	-2
Footw. Wear.	-1.5	11.2	1.9	-14.6	-6.3	-20.6	-0.1	14.4
Wood-Cork	-16	0.8	0.1	-16.9	-21	-10	-3	-8
Furniture	-53	1	-2	-52	-18	-14	0.3	-4.3
Paper-Prod.	29	-0.4	-9.6	39	-2	-19	-4	21
Print. Publ.	56	2	14	40	21	0.5	4.5	16
Leather	-21	8	1	-30	10	-24	-20	54
Rub. Plastics	-2.1	1.8	0.4	-4.3	7.7	-18	-0.1	25.8
Chemicals	8.7	2	6	0.7	13	-11	0.4	23.6
Petrol-Prod.	22	7	13	2	114	-2	-2	118
Non Met. Min.	6.6	-0.3	5.6	1.3	-57	-21	1	-37
Basic Metals	29	9	15	5	-44	-50	-1	7
Metal Prod.	23	-2	6	19	-20	-24.4	-0.3	4.7
Machinery	-43	9	-5	-47	-1.7	-10.2	0.4	8.1
Electrical	-7.2	-2.8	-9.6	5.2	6	-12.1	0.1	18
Transport Eq.	11	17	6	-12	-21	-36	0	15
Miscellaneous	-13	7	-1	-19	1.2	-21.1	-1.7	24
Total	1	2.4	2.4	-3.8	-7	-19.9	-0.1	13

where V = growth of output, SwL = growth of labour share; SπK = growth of capital share; TFP = growth of total factor productivity. Source: as tables 3.2, 4.1, 4.7 and 5.2.

Table 5.13 shows the contributions to growth of GDP in Greek and UK manufacturing industries during the last sub-period examined 1978-84.

Over this period there has been a deceleration of growth of GDP in Greek manufacturing industry largely due to the second oil crisis that increased prices of raw materials and oil. The main contributor to industries that realized positive growth of output was mainly capital and then labour. The growth of TFP was the main contributor to growth of GDP of some industries such as paper and products, printing and publishing, and metal products.

In the UK the growth of output was negative for total manufacturing and many individual industries influenced mainly by the second oil crisis that brought a world recession. The main contributor to growth of GDP was the growth of TFP. The contribution of labour to growth of output was negative for most industries except printing and publishing resulting from the fall in employment. This negative labour contribution was not compensated for by the growth of capital, due to accelerated scrapping (see chapter 4) realized this period of time; this confirms the findings of other studies.[11]

During 1978-84 Greek and UK industries did not reflect similar patterns of growth. Over this period of time, the main contributors to growth of GDP in Greece were the growth of capital and labour shares (mainly capital) while in the UK there has been a decrease of growth of output, labour, and capital shares. Therefore, it is difficult to say that there has been a real technological progress in the UK between 1978-84.

Table 5.14

CONTRIBUTIONS TO GROWTH OF GROSS DOMESTIC PRODUCT IN GREEK AND UK MANUFACTURING INDUSTRIES, 1963-84, (%).

	GREECE				UNITED KINGDOM			
	V	SwL	SπK	TFP	V	SwL	SπK	TFP
Food	195	13	110	72	85	-16	20	81
Beverages	536	8	277	251	17	-21	51	-13
Tobacco	8.4	-33	0	41.4	-26	-48	24	-2
Textiles	288	10	138	140	-51	-54	2.9	0.1
Footw. Wear.	179	35	326	-182	0.15	-43	5.05	38.1
Wood-Cork	197	24	453	-280	418	-24	12	430
Furniture	73	46	241	-214	-42	-20	34	-56
Paper-Prod.	275	34	189	52	31	-28	11	48
Print. Publ.	427	18	925	-516	66	-10	18	58
Leather	39	66	39	-66	4.4	-40.3	-16.1	60.8
Rub. Plastics	564	71	450	43	89	-10	49	50
Chemicals	482	41	200	241	55	-13	45	23
Petrol-Prod.	218	89	5612	-5483	416	-23	25	414
Non Met. Min.	359	10	388	-39	-43	-36	16	-23
Basic Metals	1393	170	345	878	-50	-60	4	6
Metal Prod.	283	27	340	-84	32	-27	7	52
Machinery	89	73	174	-158	36	-25	5	56
Electrical	238	91	200	-53	42	-20	5	57
Transport Eq.	361	168	175	18	-7.4	-47	0	39.6
Miscellaneous	475	38	262	175	38	-27	9	56
Total	274	30	242	2	18	-31	11	38

where V = growth of output; SwL = growth of labour share; SπK = growth of capital share; TFP = growth of total factor productivity. Source: as tables 3.2, 4.1, 4.7 and 5.2.

Table 5.14 shows the contributions to growth of GDP of Greek and UK manufacturing industries over the entire period examined, 1963-84.

The main contributor to growth of GDP of Greek manufacturing industry was firstly the growth of capital and then labour. Although the growth of TFP contributed only by 2 per cent to the growth of GDP of total Greek manufacturing there were industries such as tobacco, textiles, chemicals, and basic metals of which the main contributor to growth of output was TFP growth.

In the UK, the growth of TFP contributed mainly to the growth of GDP. The growth of capital was the second most important contributor to the growth of output except in the cases of beverages and chemicals which main contributor to growth of output was the growth of capital share. Labour influenced negatively the growth of GDP resulting from the fall in employment.

Looking at the entire period examined, the main contributor to growth of output was the growth of capital share in Greek manufacturing and the growth of TFP in UK industry.

Table 5.15

Labour productivity growth regressed against total factor productivity growth, total factor input growth and labour growth in Greek and UK manufacturing industries, 1963-84.

Period	Greece				
1963-68	LP = 16.3	+ 0.71 TFI	+ 0.72 TFP	- 1.19 LA	R2 = 0.96
		(18.6)	(20.1)	(-10.9)	d = 2.65
1968-74	LP = 4.39	+ 0.95 TFI	+ 0.77 TFP	- 1.30 LA	R2 = 0.97
		(18.8)	(25.2)	(-17.8)	d = 2.79
1974-78	LP = -0.86	+ 0.99 TFI	+ 0.88 TFP	- 0.91 LA	R2 = 0.98
		(21.1)	(22.3)	(-11.9)	d = 2.19
1978-84	LP = 0.49	+ 0.85 TFI	+ 0.97 TFP	- 0.84 LA	R2 = 0.99
		(18.8)	(84.5)	(-13.9)	d = 2.02
1963-84	LP = 86.5	+ 0.55 TFI	+ 0.50 TFP	- 1.57 LA	R2 = 0.89
		(12.2)	(12.8)	(-9.52)	d = 2.35

Period	United Kingdom				
1963-68	LP = 1.16	+ 0.93 TFI	+ 0.94 TFP	- 1.05 LA	R2 = 0.99
		(23.8)	(358.9)	(-20.1)	d = 1.75
1968-74	LP = -4.65	+ 1.18 TFI	+ 1.25 TFP	- 1.51 LA	R2 = 0.99
		(19.5)	(33.5)	(-21.9)	d = 1.63
1974-78	LP = -0.45	+ 0.97 TFI	+ 1.07 TFP	- 1.09 LA	R2 = 0.99
		(37.7)	(110.5)	(-26.9)	d = 2.26
1978-84	LP = -5.61	+ 0.94 TFI	+ 1.16 TFP	- 1.33 LA	R2 = 0.98
		(3.19)	(29.4)	(-4.44)	d = 1.44
1963-84	LP = -51.8	+ 1.51 TFI	+ 1.51 TFP	- 2.94 LA	R2 = 0.99
		(7.46)	(56.3)	(-8.30)	d = 1.51

where LP is labour productivity growth; TFI is total factor inputs growth; TFP is total factor productivity growth; LA is labour growth; t-statistics are in parentheses and t= 2.101 at 5% level, two-tail test. Source: as tables 4.7, 4.24 and 5.10-5.14.

G. CONTRIBUTIONS TO GROWTH OF LABOUR PRODUCTIVITY

This section will consider the contributors to growth of labour productivity in Greek and UK manufacturing industries during different sub-periods and the entire period examined.

Consider that

$V = (V/L) * L$; where V is output and L is labour.

Let $\dot{V} = dV/dt$ etc.; where t is time and d represents derivatives.

Then $\dot{V} = (V/L) * \dot{L} + L * (\dot{V/L})$.

Dividing by V,

$\dot{V}/V = (\dot{L}/L) + ((\dot{V/L}/(V/L))$ (9) or,

rate of growth of output $(\dot{V}/V)$ = rate of growth of labour $(\dot{L}/L)$ + rate of growth of labour productivity $((\dot{V/L})/(V/L))$.

But according to equation (4) the rate of growth of output also equals the rate of growth of TFP and total factor input (TFI). Substituting equation (4) into (9) and rearranging the following expression is derived:

$$LPg = TFIg + TFPg - Lg \qquad (10)$$

where LPg is labour productivity growth;

TFIg is total factor input growth;

TFPg is total factor productivity growth; and

Lg is labour growth

Equation (10) is studied for Greek and UK manufacturing sectors during different sub-periods and between 1963 and 1984.

In order to get unbiased and best possible results, seemingly unrelated regression equations (SURE) are run. The most natural application of SURE is to sets of equations that are related (as is the case here, since comparison between Greek and UK industries is undertaken).[12] Furthermore, the application of SURE gives, usually, improved t-statistics in comparison to ordinary least squares.

Seemingly unrelated regressions are run, based on equation (10), for Greek and UK manufacturing sectors and the findings are demonstrated in table 5.15.

It is apparent from table 5.15 that the most important contributor to growth of labour productivity has been the growth of TFP in Greek and UK manufacturing industries, during all sub-periods and the entire period examined. Between 1963 and 1984, the second most important contributor to growth of labour productivity has been the growth of TFI in Greece and the growth of labour in the UK. The growth of labour productivity was found to be inversely and significantly related to growth of labour in both manufacturing sectors during all sub-periods and between 1963-84.

The question that is posed now is how different the functions seen in table 5.15 for Greece and the UK are during different periods of time. Are the estimated functions significantly different between Greece and the UK, or is the difference insignificant?

To answer these questions the following F test suggested by Chow[13] is performed.

The F test is estimated as follows:

$$F^* = \frac{[\, \Sigma e^2 p - (\Sigma e^2 1 + \Sigma e^2 2)\,] / K}{(\Sigma e^2 1 + \Sigma e^2 2) / (n_1 + n_2 - 2K)} \qquad (11)$$

where $\Sigma e^2 p$ is the "pooled" residual variance, that is the unexplained variation when the two samples (here, the samples for Greece and the UK) are considered together;

$\Sigma e^2 1$ and $\Sigma e^2 2$ are the unexplained variations of the two samples, Greece and the UK respectively;

n_1 and n_2 represent the number of observations for Greece and the UK respectively; K is the number of parameters.

Seemingly unrelated regressions are run and the findings on $\Sigma e^2 p$, $\Sigma e^2 1$ and $\Sigma e^2 2$ are substituted into equation (11).
The findings show that $F^* = 12.4$ for the period 1963-68; $F^* = 14.9$ for the period 1968-74; $F^* = 11$ for the period 1974-78; $F^* = 35.2$ for the period 1978-84 and $F^* = 75.1$ for the period 1963-84.

The theoretical value of $F_{0.05}$ (5 % level) with $v_1 = K = 4$ and $v_2 = (n_1 + n_2 - 2K) = 34$ degrees of freedom is 2.65.
The null hypothesis is $b_i = \beta_i$, that is, there is no difference in the coefficients obtained from the two samples, i.e. Greece and the UK. If $F^* > F0.05$ the null hypothesis is rejected.

It is apparent, that in all sub-periods and the entire period examined the F^* found exceed the $F_{0.05} = 2.65$. Therefore, the null hypothesis is rejected, that is, that the functions for Greece and the UK differ significantly during all sub-periods and between 1963 and 1984.

H. CONCLUSIONS

The main purpose of this chapter was to test the third hypothesis of this study that there was a convergence between the patterns of growth of TFP in Greek and UK industries.

Total factor productivity growth was estimated following NEDO's (equation 1) and Todd's models (equation 4).

To estimate total factor productivity growth, it was necessary to estimate first the rate of return on capital (equ. 8), as well as labour (equ. 2) and capital (equ. 3) shares on output at a base year 1974.

The return on capital in total Greek manufacturing industry was over triple that realized in the UK in 1974. Most Greek and UK manufacturing industries showed higher labour shares (i.e. α) than capital shares (i.e. β) on output.

It was found that there was a tendency of convergence between the patterns of growth of TFP in Greek and UK manufacturing industries during the first two sub-periods but not since then.

Total factor productivity of total UK manufacturing industry grew at a faster rate than in Greece over the whole examined period, 1963-84. Total factor productivity of Greek industry was increasing at a faster rate than its counterpart until 1974. Since then UK industry was performing far better than the Greek.

Furthermore, the differences between the Greek and UK total factor productivities (following equation 1) were studied over time. The findings showed that over the entire period examined, the convergence hypothesis between Greek and UK manufacturing industries in respect of total factor productivity was not supported.

There was found a significant and positive association between TFP growth and capital and labour productivities, the relation being stronger in the UK.

The sectoral rankings in terms of growth of TFP, labour, and capital productivities were shown for both industries across the period 1963-84. In Greece the industries that realized the highest growth rates according to total factor productivity, labour, and capital productivity were: basic metal industries, beverages, textiles, chemicals and miscellaneous. In the UK the equivalent industries were wood and cork, petrol and products, leather and fur, food and miscellaneous. There was not a great similarity of sectoral rankings between Greece and the UK using the same measures.

The contributions to growth of GDP in both Greek and UK industries over different sub-periods and the entire period examined were examined. It was found that both industries did not pursue similar growth cycles since the most important contributor to growth of GDP in Greece was firstly the growth of capital share and then labour share on output, during 1963-84. In the UK, over the same period, the most important contributor was TFP growth and then capital share while labour share, due to the fall in employment, contributed negatively to the growth of GDP.

Finally it was demonstrated that the main contributor to growth of labour productivity was the growth of TFP in both manufacturing sectors during 1963-84.

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CHAPTER SIX

TRADE PERFORMANCE

A. INTRODUCTION

> "Many countries have concluded that the route to development lies not through increased specialization in production of primary products but in expansion of industries that produce manufactures."[1]

The prosperity of an economy depends largely on its trade performance and particularly on its manufacturing industry. One aspect of industrial performance that cannot be neglected is the success or failure of an industry in terms of trade performance.

This chapter compares the performance of Greek and UK manufacturing sectors in terms of imports and exports. Furthermore, it studies the factors that influenced imports and exports in the two sectors. But the main purpose is the examination of the fourth and final hypothesis of convergence between Greek and UK manufacturing industries in respect of trade performance. It will be expected to find faster trade growth in Greek industry than in the UK and diminishing differences of the two sectors in respect of trade balance ratios.

This analysis expresses exports and imports in terms of industries, as defined by the Standard Industrial Classification. It differs from the normal presentation based on the Standard International Trade Classification that is devised by the United

Nations and is a commodity classification. As this thesis examines the performance of twenty Greek and UK manufacturing industries data sets referring to trade by commodity would have been of little use to assess and compare the trade performance of the Greek and UK industries. Hence, the figures on imports and exports in this chapter represent commodities imported and exported according to the industries of which they are principal products.

The data for Greece concerning imports and exports were obtained from the Centre of Planning and Economic Research in Athens and represented mostly unpublished figures that were then deflated into 1974 constant prices. As a deflator of exports the "wholesale price index; exported products of domestic primary and industrial production" was used, taken from the "Monthly Statistical Bulletin", different editions, of the National Statistical Service of Greece. From the same source the imports deflator was extracted for Greece called "wholesale price index; final products of foreign origin".

Disaggregated data for the UK was obtained from the "CSO Input-Output Tables for the UK" for the years 1963 and 1968 and from the Business Monitor M10 "Overseas Trade Analysed in Terms of Industries" for the years 1970-84. Data for the rest of the years was taken from various editions of the "Yearbook of International Trade Statistics". The data sets of exports and imports were transformed into 1974 constant prices using as a deflator of exports the "implied deflator; exports of goods and services" and as a deflator of imports the "implied deflator; imports of goods and services". Both deflators were extracted from the "CSO UK

National Accounts" 1985 edition.

The estimation of import demand equation of total Greek and UK manufacturing industries needed extra statistical information concerning the gross national product (GNP), overall import duties, and wholesale price index.

The datasets on gross national product were taken from "The National Accounts", different editions for Greece and from "CSO UK National Accounts" 1985 ed. for the UK. The figures for import duties were taken for Greece from "National Accounts of OECD Countries", volume II, for the years 1963-81 and from the "Monthly Statistical Bulletin, Bank of Greece" for the rest of the years. For the UK the equivalent data was taken from the "National Accounts of OECD Countries", volume II, different editions. The datasets for wholesale price index were taken for Greece from "The Greek Economy in Figures" 1984 and 1986
editions and for the UK from the "International Financial Statistics" edition 1987.

The estimation of export demand equation of total Greek and UK manufacturing industries dictated additional statistical information on OECD gross domestic product (WGDP) and world unit value index of commodity exports.

The data on OECD GDP was extracted from "National Accounts of OECD Countries" ed. 1975, volume I for the years 1963-1973 and from the "OECD Main Economic Indicators", different editions for the rest of the years. OECD GDP figures were originally in dollars and were converted into drachmas and sterling using the exchange rates listed in the "International Financial Statistics", edition

1987. The figures concerning the world unit value index of commodity exports were taken from the "International Financial Statistics", edition 1987.

The structure of this chapter is as follows:

B. The significance of imports and exports in Greece and the UK

C. Import and export demand functions

- *Import demand function*
- *Export demand function*

D. The distribution and growth of imports and exports by sector

- *Imports*
- *Exports*
- *Imports in relation to exports*

E. Import penetration, exports in relation to output and trade competitiveness

- *Import ratios*
- *Export ratios*
- *Trade balance ratios*

F. Conclusions

G. References

Sections B and C give the general picture of trade performance of total Greek and UK manufacturing sectors across the period 1963-84 while sections D and E give extra information on their trade development at an aggregate and disaggregate level concentrating mostly on the benchmark years 1963, 1968, 1974, 1978 and 1984.

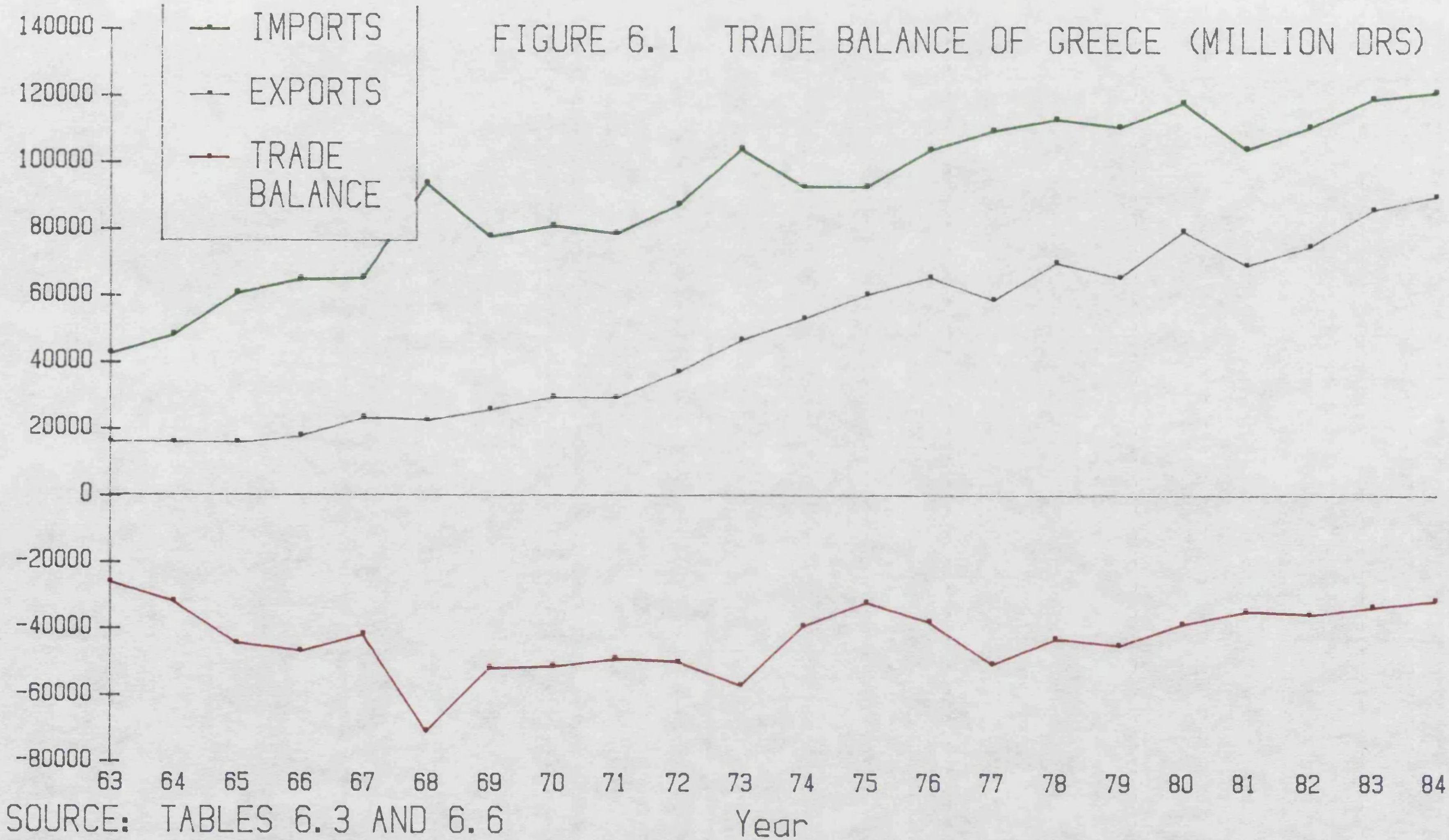


FIGURE 6.1 TRADE BALANCE OF GREECE (MILLION DRS)
IMPORTS
EXPORTS
TRADE BALANCE
140000
120000
100000
80000
60000
40000
20000
0
-20000
-40000
-60000
-80000
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
Year
SOURCE: TABLES 6.3 AND 6.6

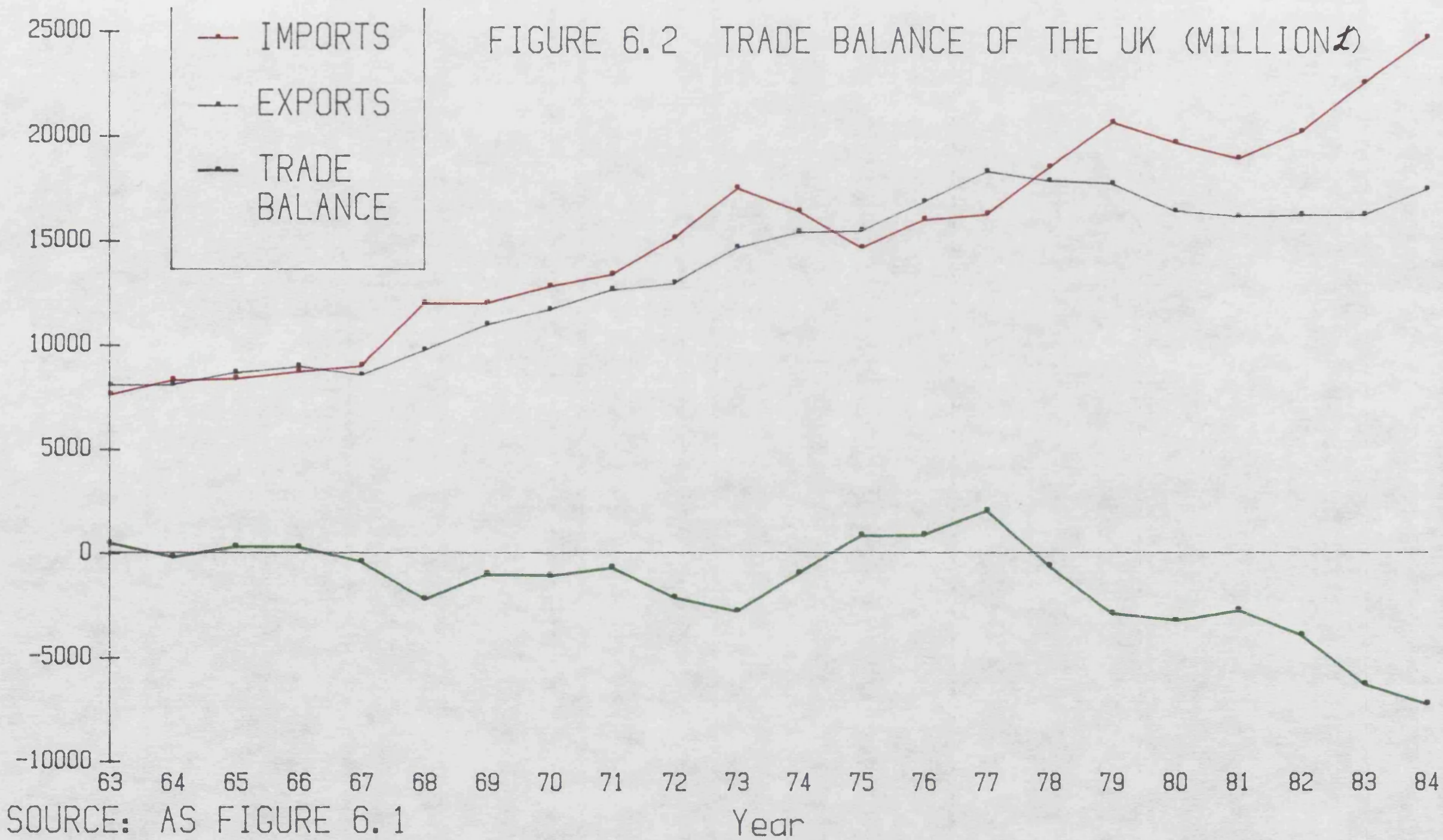


FIGURE 6.2 TRADE BALANCE OF THE UK (MILLION£)
IMPORTS
EXPORTS
TRADE BALANCE
25000
20000
15000
10000
5000
0
-5000
-10000
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
Year
SOURCE: AS FIGURE 6.1

B. THE SIGNIFICANCE OF EXPORTS AND IMPORTS IN GREECE AND THE UK

Before considering the aggregate import and export demand functions of manufactured goods of Greece and the UK, the trade performance and significance of both manufacturing industries as a whole will be assessed.

Figures 6.1 and 6.2 show the manufactured exports and imports in both countries during 1963-84.

It is apparent from figure 6.1 that exports overall increased in Greek manufacturing over the entire period examined. Its highest growth was between 1968 and 1974 largely influenced by industrial policies such as loans and advances to industry that stimulated investments (see appendix two) and growth of fixed capital stock as well as output. Furthermore, laws were introduced aiming at providing incentives for exports such as duty exemptions, tax deductions based on gross receipts from exports and special reduced interest rates for export industries.[2]

In the UK (figure 6.2), manufactured exports rose more or less continuously during 1963-77 but dropped since then, only to increase again between 1983 and 1984 to a lesser extent than imports. The highest growth of exports in UK manufacturing occurred during 1968-74 (see table 6.8) helped by the 1967 devaluation of sterling and acceleration in the growth of world trade.

Manufactured imports of both countries can also be seen in figures 6.1 and 6.2. It is apparent that imports in Greece increased rapidly during 1963-68. Considering the period 1968-74 there has been a particular fast rise of imports in 1973 due to the oil crisis that boosted the prices of raw materials and oil but the drachma devalued in 1973 and import growth decelerated in 1974. Since 1974 imports increased more or less continuously but the fastest growth of imports in Greek manufacturing was between 1963 and 1968; over this period there was an intensive level of activity in the economy and imports of goods were necessary to set the basis for the further industrialization of the economy.[3]

In the UK, manufactured imports increased between 1963 and 1984. The fastest growth of imports in the UK occurred during 1963-68 largely influenced by reflationary policies such as reduction in direct taxes that affected the growth of consumer demand and imports. Between 1968 and 1974 (see table 6.4) the growth of imports was not as intensive as in the previous sub-period. But they intensified between 1978 and 1984 and particularly during 1983-84 due to a large increase of fuel imports as a consequence of the miners' strike.[4]

Figures 6.1 and 6.2 show also the trade balances for manufacturing sectors of both Greece and the UK during 1963-84. The trade balance of Greek manufacturing deteriorated rapidly between 1963 and 1968 due to a great increase of imports realized at that period of time. This was largely due to government policies that through loans and advances to manufacturing stimulated investments (see appendix two) and imports that were vital for the industrial development of the economy. Since 1968, when the trade deficit reached its peak in Greece, the deficit decelerated more or less continuously due to faster growth of exports in comparison to imports.

In UK manufacturing in 1963 there was a surplus in the trade balance, but there was a very rapid deterioration between 1963 and 1968 due largely to rapid increase of imports. In 1974 in the UK, the deficit of the balance of trade dropped in relation to its 1968 level as over this period (i.e. 1968-74) the fastest growth of exports occurred and imports did not increase as fast as exports (see tables 6.4 and 6.8). Between 1974 and 1977 there was an improvement of the trade balance in the UK due to the marked amelioration in the competitive position of British goods as average export values declined (owed to depreciation of sterling) and the growth of unit labour costs decelerated (see table 4.26). But the deficit worsened rapidly between 1978 and 1984 influenced by external factors such as the oil crisis that brought a world recession. There were also internal factors such as rise in private consumption (by 5.9 %) which was associated with a fall in the savings ratio since the end of the second oil crisis as well as a large increase of fuel imports in 1984 due to the miners' strike. OECD[4] comments:

> "In 1983, for the first time since 1981 when energy balance started being in surplus, the surplus on oil was not sufficient to offset the non-oil trade deficit and this has continued in 1984..."

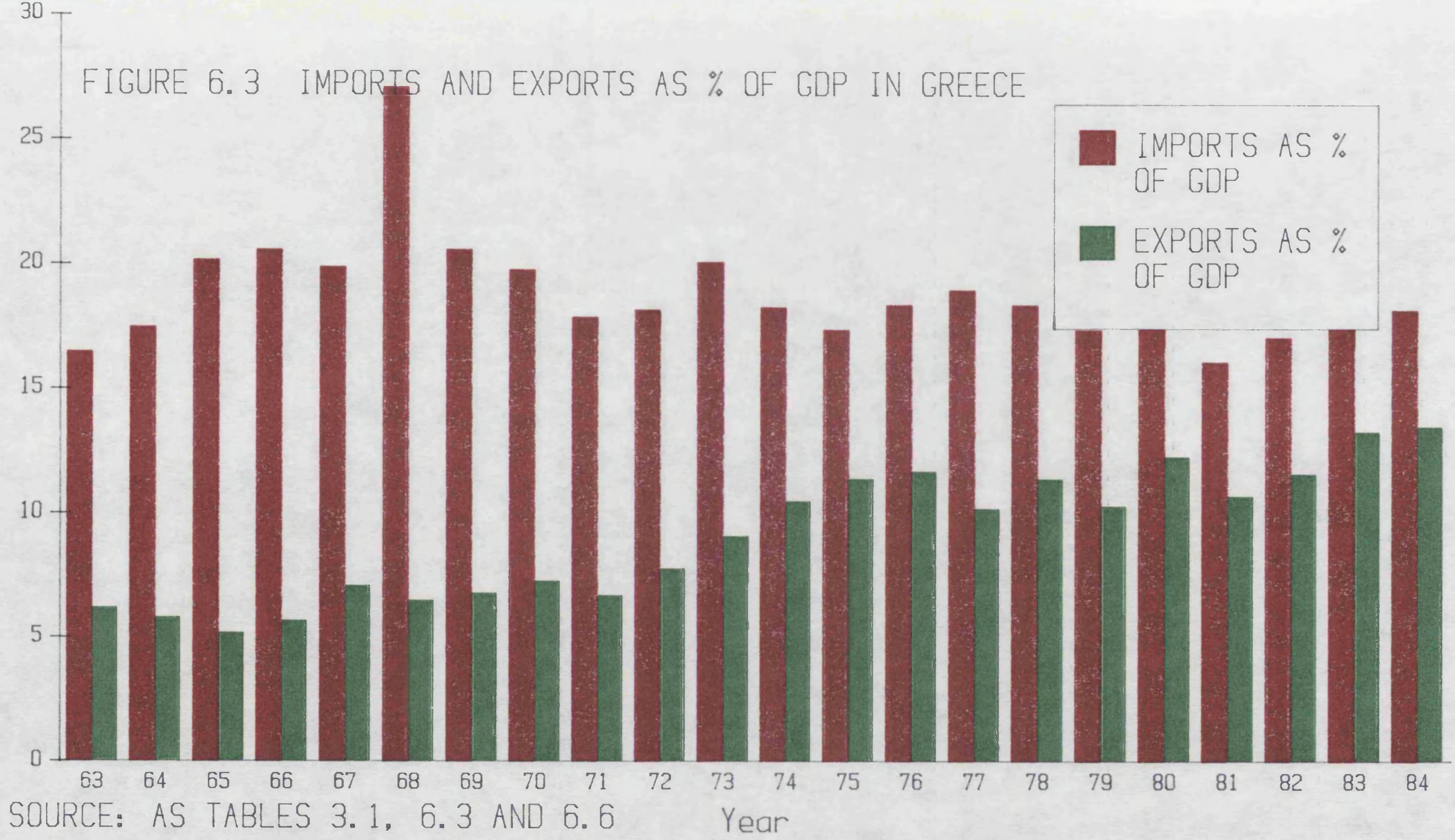


FIGURE 6.3 IMPORTS AND EXPORTS AS % OF GDP IN GREECE
IMPORTS AS % OF GDP
EXPORTS AS % OF GDP
30
25
20
15
10
5
0
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
Year
SOURCE: AS TABLES 3.1, 6.3 AND 6.6

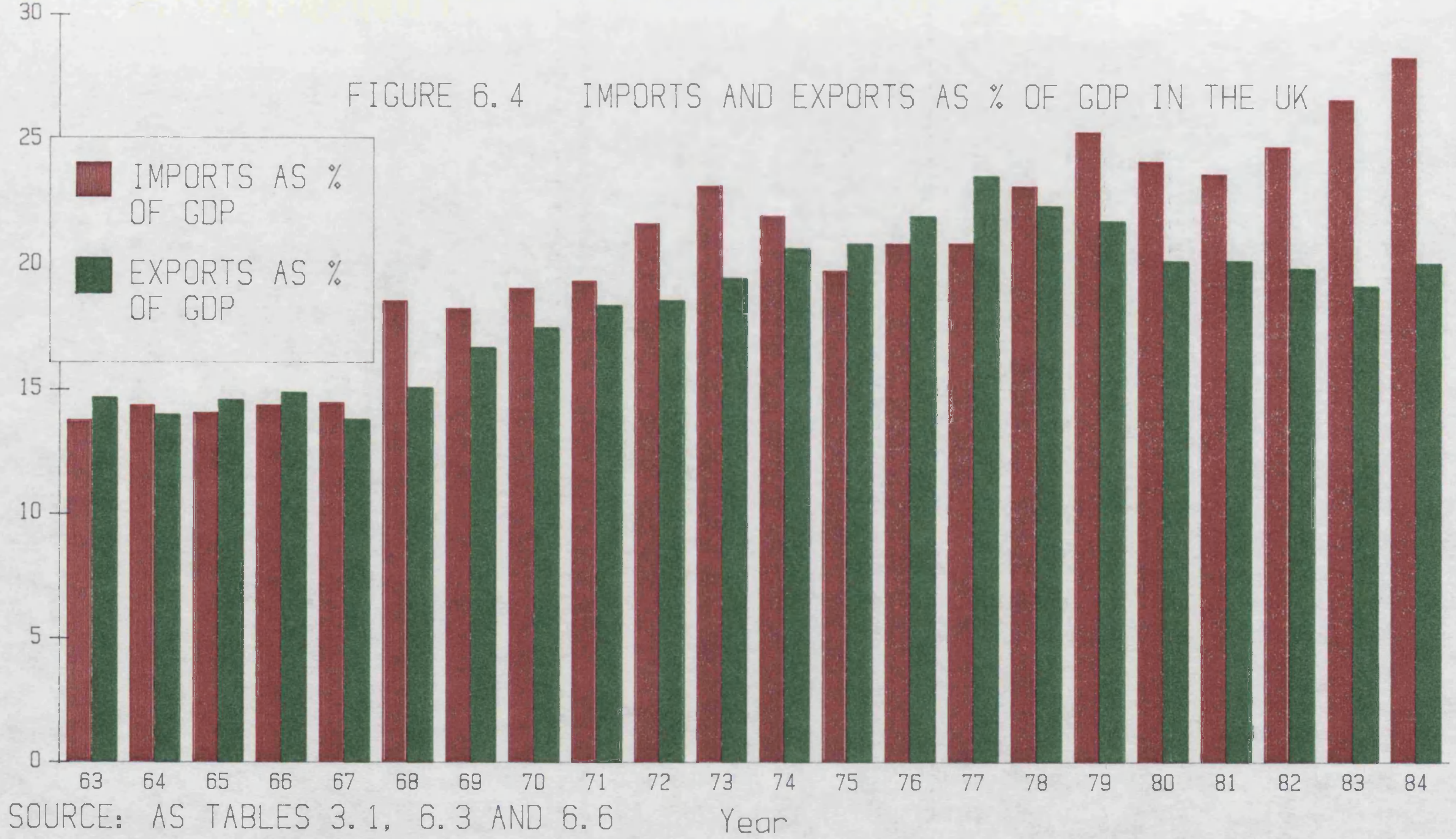


FIGURE 6.4 IMPORTS AND EXPORTS AS % OF GDP IN THE UK
IMPORTS AS % OF GDP
EXPORTS AS % OF GDP
30
25
20
15
10
5
0
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
Year
SOURCE: AS TABLES 3.1, 6.3 AND 6.6

Figures 6.3 and 6.4 show the manufactured exports and imports as a percentage of gross domestic product (GDP) in Greece and the UK, respectively, during 1963-84.

Greek manufactured exports represented only 6.2 per cent of GDP in 1963 while UK manufactured exports reflected 14.7 per cent of GDP. This indicates that UK trade performance and particularly export achievement was at a much higher level than the Greek at that time. During 1963-84 the share of exports in the GDP increased by 117.7 per cent in Greece. In the UK the percentage distribution of exports in the GDP rose between 1963 and 1977 but fell since then only to increase again between 1983-84 but to a lesser degree than imports.

The share of imports in GDP can also be seen in figures 6.3 and 6.4. It is apparent from these figures that in 1963 the share of imports in GDP was 16.5 per cent in Greece and 13.8 per cent in the UK. Between 1963 and 1968 the share of imports in GDP increased in Greece and since then stabilized at around 18.3 per cent level. In the UK there has been a continuous increase of the share of imports in the GDP over the entire period examined. Since 1971 the share of imports in GDP in the UK surpassed that of Greece indicating deterioration of the trade performance of UK manufacturing.

To sum up, this preliminary analysis has shown that Greek and UK industries did not experience similar patterns in respect of trade, across the period 1963-84, since Greece improved its trade performance while the UK did not. It seems from figures 6.3 and 6.4 that there was a tendency towards convergence between Greek and UK manufacturing industries in terms of export performance since the share of exports in the GDP increased by 117.7 per cent in Greece and by 36.7 per cent in the UK during 1963-84. But still the level of exports in relation to GDP was lower in Greece than in the UK in 1984. Furthermore, during 1963-84, the share of imports in the GDP rose by 10.3 per cent in Greece and by 105.8 per cent in the UK. Figures 6.3 and 6.4 showed that there has been a convergence between the two industries in respect of share of imports in the GDP and since 1971 the level of imports in the GDP was higher in the UK, in relation to GDP, than in Greece. The findings up to this point indicate improvement of Greek industry and deterioration of the UK with reference to trade performance.

The total manufactured exports and imports of both countries as well as their trade balance and importance in relation to their GDP have been examined. The next section will study the aggregate import demand and export demand functions in order to see the factors that influenced the growth of manufactured imports and exports in both countries across the period 1963-84. The purpose being to study whether Greek and UK industries pursued similar growth cycles and test more thoroughly a possible tendency towards convergence in association with trade performance.

C. IMPORT AND EXPORT DEMAND FUNCTIONS

- *Import demand function*

The scope of this section is to examine the aggregate import and export demand functions of total Greek and UK manufacturing industries across the period 1963-84 in order to detect the factors that mainly influenced manufactured imports and exports and appraise whether Greek and UK industries reflected similar development patterns.

It was not possible to examine the import and export demand functions of the twenty manufacturing industries of both countries due to data limitations for Greek industry (see appendix one).

The estimation of the aggregate import demand function follows the Prodromidis and Anastassakou[2] equation which general form is:

$$IM/P_m = IM \left[Y, (1 + d_m) P_m/P_d, z, u_m \right] \quad (6.A)$$

where IM = value of manufactured imports (cif) at current prices

P_m = implicit price deflator of imports

Y = gross national product at constant prices

d_m = ratio of import duties at current prices to the current value of imports (cif)

P_d = wholesale price index

z = other relevant factors that may affect imports, especially dummy variables, and

u_m = random disturbance term.

Table 6.1

Estimates of aggregate import demand function for manufactured goods in Greece and the UK, 1963-84.

Greece

1) $MA_t = 3.4 + 0.73\ GNP_t - 0.76\ P_t + 0.19\ MA_{t-1}$ $\quad d=1.63$

double-log (5.2) (-4.2) (1.5) $\quad R^2=0.95$

2) $MA_t = 1.63 + 1.08GNP_t - 0.9P_t + 0.04\ MA_{t-1} - 0.1D_1 - 0.1D_2$; $d=1.4$

double-log (6.5) (-6.1) (0.35) (-2.0) (-2.8); $R^2=0.97$

United Kingdom

3) $MA_t = -12.0 + 1.7\ GNP_t - 0.15P_t + 0.3\ MA_{t-1}$ $\quad d=1.39$

double-log (4.1) (-0.5) (2.1) $\quad R^2=0.97$

4) $MA_t=-17.8 + 2.4GNP_t - 0.3P_t +0.2\ MA_{t-1} - 0.14D_1 + 0.03D_2$; $d=1.7$

double-log (6.3) (-1.2) (1.6) (-2.9) (0.8); $R^2=0.98$

where MA_t = manufactured imports at 1974 constant prices; MA_{t-1} = manufactured imports lagged one period at 1974 constant prices; GNP_t = gross national product at 1974 constant prices; P_t = $(1+d_m)*(P_m/P_d)$; d_m is the ratio of overall import duties to value of imports; P_m is the implicit price deflator of imports; P_d is the wholesale price index;

D_1 = first dummy variable (1 for years 1973-84 and 0 otherwise);

D_2 = second dummy variable (1 for years 1981-84 and 0 otherwise);

t-statistics are in brackets and t = 1.734 at a 5 % level of significance and t = 2.101 at a 5% level, a two-tail test. Source: see introduction of this chapter.

Here again, as in chapter five, seemingly unrelated regressions are run based on the general form of the import demand function (equation 6.A) for the period 1963-84 and the results for both manufacturing industries can be seen in table 6.1. The source of the data of table 6.1 has been explained in the introduction of this chapter.

All equations, 1-4, have as a dependent variable, MA_t, the value of manufactured imports (cif) at 1974 constant prices. The value of total manufactured imports should not be confused with the value of total imports. Equations 1 and 2 refer to Greek manufacturing industry while 3 and 4 to the UK.

The form of equations 1 and 3 is double-log and the independent variables are gross national product, GNP_t, import prices adjusted for duties, P_t, and the dependent variable lagged one period, M_{t-1}. The coefficient of the GNP_t is the income elasticity of imports which measures the sensitivity of the quantity demanded to changes in consumer incomes. Income elasticities are expected to be positive indicating that demand for imported goods increases as income rises. Here the imported manufactured goods are elastic with respect to GNP in both Greece and the UK.

The coefficient of the price variable, P_t, in equations 1 and 3 is the price elasticity of imports. It measures the response of quantity demanded to changes in the real value or purchasing power of income.[1] The price elasticity of imports is inelastic and significant for Greece indicating that the imports of manufactured goods were not sensitive to their relative prices adjusted for duties. The price elasticity of imports is inelastic but insignificant for the UK. Lagged imports proved to be significant in the UK while insignificant in Greece (significant though at 10% level).

Equations 2 and 4 are double-log form and introduce two dummy variables that attempt to account for the impact of the two oil crises. It should be added that the 1973 oil crisis coincides with the period that the UK joined the European Economic Community (EEC) and the 1981 oil crisis with the period that Greece joined the EEC. The first dummy variable, that tries to account for the impact of the 1973 oil crisis, takes the value one for the years 1973-84 and zero elsewhere. The second dummy variable, attempting to account the impact of the second oil crisis, takes the value one for the years 1981-84 and zero elsewhere. The introduction of dummy variables helped improve the statistical findings and made the economic interpretation of the results more precise.

It is apparent from equation 2 that both oil crises, and particularly the second, had negative and significant influences (the first oil crisis is significant at 5 % level and insignificant at a two-tail test) on imports in Greece. In the UK, (equation 4) the first oil crisis had a negative and significant influence on UK imports since UK industry depended then on imports of oil. But the coefficient of the second dummy variable proved to be insignificant, indicating that the second oil crisis had an insignificant impact on UK manufactured imports, due to acceleration of production and export of North sea oil and therefore less dependence on imports of fuels. The coefficients of the price variable and GNP in equations 2 and 4 represent the short-run elasticities.

To sum up, manufactured imports in Greece and the UK were found elastic with respect to GNP. The price elasticity was proven to be inelastic and significant in Greece while inelastic and insignificant in the UK. Both oil crises influenced negatively imports in Greece while in the UK it was only the first oil crisis that was found to have had a negative impact on imports.

- *Export demand function*

The export demand function regarding total manufactured goods is estimated trying to see whether Greek and UK industries pursued similar growth cycles in relation to exports and whether the factors that influenced the manufactured exports in the two industries were alike. Due to data limitations concerning the Greek manufacturing industry only the aggregate export demand functions could be estimated for both manufacturing industries.
The model followed is Prodromidis and Anastassakou[2] and its general form can be written down as:

$$EX/P_X = EX\ [\ Y_W,\ VA,\ P_X/P_{WX},\ Z,\ U_X\ ] \qquad (6.B)$$

where EX = value of manufactured exports (fob) at current prices

P_x = implicit price deflator of exports

Y_w = activity or demand variable of the rest of the world at constant prices

VA = domestic supply variable in real terms

P_{wx} = "world" unit value index of exports

Z = other relevant factors that may influence exports and

U_x = random disturbance term.

Seemingly unrelated regressions are run based on the general form of the export demand function (6 B) and the findings can be seen in table 6.2. The source of the data for the estimation of the export demand function is discussed in the introduction of this chapter. Equation 5 refers to Greece while equation 6 to the UK.

Equations 5 and 6 are double-log form and the dependent variable is manufactured exports valued at 1974 constant prices, X_t. The independent variables are OECD gross domestic product, $WGDP_t$, prices, WP_t, and exports lagged one period, X_{t-1}.

The coefficient of foreign income, $WGDP_t$, was greater than one for Greece indicating that exports were foreign income elastic while in the UK exports were foreign income inelastic. This means that Greek manufactured exports depended on foreign income and its fluctuations while UK exports were inelastic in relation to foreign income.

The coefficient of prices, WP_t, shows that there was a price elastic demand in Greece while inelastic (and insignificant at the

Table 6.2

Estimates of aggregate export demand functions for manufactured goods in Greece and the UK, 1963-84.

Greece

5) $X_t = -19.0 + 1.7\ WGDP_t$	$- 1.2\ WP_t$	$+ 0.3\ X_{t-1}$		$d = 1.57$
double-log (4.5)	(-4.5)	(1.9)		$R^2 = 0.98$

United Kingdom

6) $X_t = -2.44 + 0.61\ WGDP_t$	$- 0.11\ WP_t$	$+ 0.39\ X_{t-1}$		$d = 1.55$
double-log (6.1)	(-1.8)	(4.4)		$R^2 = 0.99$

where X_t = exports at 1974 constant prices;

X_{t-1} = exports lagged one period at 1974 constant prices;

$WGDP_t$ = OECD GDP at 1974 national constant prices (i.e. Drs,£);

WP_t = IP_x/IP_{wx} where IP_x is the implicit price deflator of exports and IP_{wx} the "world" unit value index of exports;

t-statistics are in brackets and t = 1.734 at a 5% level of significance and t = 2.101 at a 5 % level, a two-tail test.

Source: see introduction of this chapter.

5% level, two-tail test) in the UK. This means that exports of manufactured goods in Greece were significantly affected by export prices while in the UK they were not. Recent calculations indicate that the "J" curve effect is strong in the UK and some estimates suggest up to five years as being the appropriate time-lag for the effects of price changes to be fully reflected in trade performance.[5]

Equations 5 and 6 show that in both countries lagged exports were significant factors of exports of manufactured goods (however, in Greece they were significant only at a 5% level and not at a two-tailed test). This demonstrates a stability of exports and also indicates that the influence of past habits was great in the determination of current exports.

To sum up, the examination of the aggregate export demand functions for both manufacturing sectors showed that manufactured exports were foreign income elastic in Greece and foreign income inelastic in the UK. There was a price elastic demand in Greece and inelastic in the UK. Lagged exports were found determining factors of exports in both countries.

D. THE DISTRIBUTION AND GROWTH OF IMPORTS AND EXPORTS BY SECTOR

- *Imports*

After examining aggregate import and export demand functions this sub-section will examine the structure and growth of imports of 20 Greek and UK manufacturing industries during 1963-84.

Table 6.3 shows the percentage distribution of imports of the two manufacturing sectors in the benchmark years 1963, 1968, 1974, 1978 and 1984.

The industries with the highest proportion of imports in Greece over the entire period examined were manufacture of machinery, food industry, chemicals, transport equipment and chemicals.

In the UK the equivalent industries between 1963 and 1984 were food manufacturing industry, chemicals and machinery. Since 1968 and 1974 the share of imports of transport equipment industry and the manufacture of electrical machinery had increased, respectively, in the total manufactured imports in the UK.

Table 6.3

PERCENTAGE DISTRIBUTION OF MANUFACTURED IMPORTS IN GREEK AND UK INDUSTRIES, 1963-84.(1974 CONSTANT PRICES)

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	13	29	12	19	9	14	11	11	16	9
Beverages	0.2	2	0.3	1.6	0.3	2	0.3	1.4	0.5	1.4
Tobacco	0	0.1	0	0.1	0.1	0.1	0.2	0.2	0.7	0.2
Textiles	8	8	7	7	6	6	5	6	7	5
Footw. Wear.	0.8	2	0.6	3	0.6	3	0.8	3	1.8	4
Wood-Cork	4	0.4	3	0.3	2	0.3	1.5	0.2	1.3	0.2
Furniture	0.1	7	0.2	5	0.1	5	0.2	4	0.2	3
Paper-Prod.	3	7	3	6	4	6	3	5	4	4
Print. Publ.	0.2	0.7	0.3	0.7	0.2	0.6	0.3	0.6	0.3	0.8
Leather	0.1	1	0.1	0.7	1.3	0.5	1.3	0.8	4	0.7
Rub. Plastics	1.9	0.9	2	0.8	1.2	1.3	1.4	1.5	1.6	3
Chemicals	14	8	12	8	14	10	13	10	15	10
Petrol-Prod.	4	6	3	5	3	5	5	4	4	7
Non Met. Min.	1.7	0.9	1.5	0.8	1.2	1.1	2	1.2	1.6	1.3
Basic Metals	9	10	7	10	12	10	9	7	7	7
Metal Prod.	4	2	6	9	4	8	3	5	3	2.3
Machinery	16	9	18	10	21	11	15	12	14	16
Electrical	8	3	9	5	8	8	7	10	6	11
Transport Eq.	9	2	13	7	10	7	18	16	9	13
Miscellaneous	3	1	2	1	2	1.1	3	1.1	3	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AD	68.8		55.2		45.0		31.0		43.6	

AD = sum of the absolute differences between the Greek and UK distributions.

Source: Greece_ Centre of Planning and Economic Research in Athens. UK_ "CSO, Input-Output Tables for the UK", years 1963 and 1968; "Overseas Trade Analysed in Terms of Industries", Business Monitor M10, years 1974, 1978, 1984

The sum of the absolute differences between the percentage distributions of imports of the two manufacturing industries, seen at the bottom of table 6.3, indicate that the two distributions were quite similar and were most similar in 1978. The industries that held among the highest shares of total imports in both manufacturing industries during 1963-84 were the food industry, chemicals and machinery.

Table 6.4 shows the percentage change of imports in Greek and UK manufacturing industries over different sub-periods and the entire period examined 1963-84.

It is apparent from table 6.4 that imports of UK manufacturing industry grew faster than in Greece between 1963 and 1984.

The fastest increase of manufactured imports in Greece was between 1963 and 1968. This was the outcome of a deliberate economic policy being followed which, through loans and advances to manufacturing, stimulated investments and imports aiming at the industrialization of the country.[6,3] Investments in Greek manufacturing industry grew by 51.1 % between 1963 and 1968 (see appendix two).

The growth of manufactured imports in Greece dropped rapidly between 1968 and 1974 while exports were expanding very fast. In 1973 imports increased (see figure 6.1) due to the oil crisis but fell in 1974 due to the slackening economic activity following the 1973 oil shock; this is confirmed by other studies.[7,8]

Table 6.4

PERCENTAGE CHANGE OF MANUFACTURED IMPORTS IN GREEK AND UK INDUSTRIES, 1963-84.(1974 CONSTANT PRICES)

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	101	3	-26	2	60	-7	52	6	260	4
Beverages	405	42	-2	45	21	-0.4	73	32	936	171
Tobacco	166	100	265	100	351	20	288	37	16912	560
Textiles	79	24	-14	18	11	19	45	10	146	90
Footw. Wear.	66	62	-2	37	59	33	152	52	555	349
Wood-Cork	86	24	-39	26	-4	0	-10	-3	-1	52
Furniture	505	23	-48	28	100	-21	31	22	724	51
Paper-Prod.	104	24	27	48	-14	-17	37	26	206	91
Print. Publ.	185	49	-23	15	82	22	-3	66	284	247
Leather	65	15	1362	-2	14	61	227	25	8928	127
Rub. Plastics	121	35	-33	112	38	38	18	122	143	779
Chemicals	88	48	17	84	13	13	19	32	197	307
Petrol-Prod.	66	40	-15	38	99	-1.5	-16	136	134	290
Non Met. Min.	103	39	-21	93	82	17	-7	47	173	360
Basic Metals	73	61	77	34	-13	-21	-6	36	151	130
Metal Prod.	245	665	-41	22	12	-32	3	-38	136	293
Machinery	145	91	14	40	-13	29	3	78	148	513
Electrical	142	192	-7	125	10	31	-9	53	125	1217
Transport Eq.	229	432	-20	33	109	154	-48	6	186	1807
Miscellaneous	105	35	-12	82	77	9	18	23	277	229
Total	121	58	-1	37	22	13	7	34	188	226

Source: as table 6.3.

Between 1974 and 1978 imports rose in Greece influenced by increased consumer demand (26.1 % rise). Furthermore, over the same period of time, there has been a 99 % increase of imports of oil when the the growth of total manufactured imports was 22 % (table 6.4) influenced by the growth in industrial production and by anticipation of price increases.

The growth of imports decelerated in the last examined sub-period 1978-84 particularly since 1981, this is in accordance with other studies.[9] Epilogi[10] argues that this was largely due to the retardation of growth consumer demand and investments.

Table 6.4 shows that the industries that displayed fastest growth in imports in Greece during 1963-84 were tobacco manufactures, leather and fur, beverages, furniture and fixtures, and footwear and wearing. The manufactures of wood and cork realized a negative percentage change of imports in Greece over the same period of time.

In the UK, table 6.4 shows that imports of the UK manufacturing sector rose by 58 per cent between 1963 and 1968. The UK economy was expanding very rapidly between 1963 and 1965 largely motivated by the reflationary policies that the government introduced such as reduction in direct taxes.[11] But these policies stimulated consumer demand and expanded import growth in the years following 1965, in UK manufacturing.

Sterling devalued in 1967 but did not affect the growth of imports as negatively as expected in 1968.[12] This was largely due to the "J-curve" response according to which a devaluation may lead first to a deterioration of the current account of the balance of payments but then to an amelioration in the current account.[1]

Since 1968/69 the growth of imports in the UK was not expanding as fast as in the previous sub-period. Manufactured imports in the UK rose rapidly in 1973 which was almost entirely due to price increases and particularly petroleum prices.

Deterioration of the UK balance of trade in 1973/74 helped undermine confidence in sterling which was devalued in 1976.[13] However, although there was a deterioration of the balance of trade in 1973/74 the growth of imports in the UK between 1968 and 1974 was less intensive in comparison to the 1963-68 period (see table 6.4). Since 1976 the growth of imports was restrained in the UK and over the sub-period 1974-78 imports grew to a lesser extent than in the previous sub-periods.

During the last sub-period 1978-84, the second oil crisis occurred. The 1980/81 recession that hit UK manufacturing was partly induced by the oil shock and depressed world trade as well as by the disinflationary policies adopted by the Government in order to contain inflation.[4] Sterling that had appreciated during 1979 and 1980 then depreciated in 1981.[14] But manufactured imports were increasing rapidly in the UK since 1981, this is in accordance with other studies.[15,4] The rapid increase of imports particularly between 1983 and 1984 in the UK was boosted by a large increase in fuel imports (total manufactured imports rose by 9.6 % when imports of petrol and products grew by 63 % between 1983 and 1984) as a consequence of the miners' strike.[4] Table 6.4

shows a 136 % increase in imports of petroleum and products in the UK between 1978 and 1984. Furthermore, the surplus on oil was not enough to cover the non-oil trade deficit between 1983 and 1984 in the UK.[4]

Over the entire period examined, 1963-84, the industries with the fastest growth of imports in the UK were transport equipment, electrical, rubber and plastics, tobacco, and machinery.

It is apparent from table 6.4 that Greek and UK industries did not pursue similar patterns of development since imports in Greece fell between 1968 and 1974 after a steep rise during 1963-68. In 1974-78 they increased and decelerated in the last sub-period. In the UK there has been a deceleration of growth of imports between 1963 and 1978 and acceleration in the last sub-period.

On the whole, manufactured imports rose faster in the UK than in Greece during 1963-84. Furthermore, as figures 6.3 and 6.4 showed, the share of imports in the GDP was higher in the UK than in Greece since 1971. These results are discouraging for the UK while quite positive for Greece.

There has not been a great similarity between the patterns of growth of imports of the two manufacturing industries over the entire period examined. The only common industry among those that imported the most in both countries was tobacco, although its growth of imports in Greece was nearly 30 times more than in the UK between 1963 and 1984. Industries that over the same course of time experienced higher growth of imports in Greece than in the UK were: leather and fur, beverages, furniture and food. The industries in which growth of imports was greater in the UK than in Greece during 1963-84 were: transport equipment, electrical, rubber and plastics, and machinery.

Table 6.5

Correlation coefficients between the rates of growth of imports of Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	0.23 (ns)
1968-74	-0.25 (ns)
1974-78	0.17 (ns)
1978-84	-0.07 (ns)
1963-84	0.01 (ns)

ns = not significant at the 5 % level of significance.

source: table 6.4.

The insignificant correlations, seen in table 6.5, exhibit that there has not been any similarity between the patterns of growth of imports of Greek and UK manufacturing industries during all sub-periods and the entire period examined. This confirms that Greek and UK industries did not reflect the same structure of growth of manufactured imports.

Table 6.6

PERCENTAGE DISTRIBUTION OF MANUFACTURED EXPORTS IN GREEK AND UK INDUSTRIES, 1963-84. (1974 CONSTANT PRICES)

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	23	3	25	3	18	3	21	4	20	4
Beverages	2	2	4	3	2	3	2	3	1	2
Tobacco	49	0.5	26	0.5	10	0.4	7	0.6	5	0.7
Textiles	15	9	13	8	13	6	12	5	12	4
Footw. Wear.	0.4	2	2	3	7	1	11	2	17	2
Wood-Cork	0.2	0.1	0.1	0.1	0.6	0.1	0.6	0.1	0.4	0.1
Furniture	0.1	0.2	0.1	0.2	0.1	0.5	0.2	0.7	0.1	0.5
Paper-Prod.	0.2	1	0.4	1	0.4	1	0.3	1	0.6	1
Print. Publ.	0.3	2	0.2	2	0.1	1	0.1	1	0.2	1
Leather	3	0.9	3	1	3	1	3	0.6	2	0.7
Rub. Plastics	0.2	1.6	0.2	1.6	0.6	2	0.7	2	0.7	3
Chemicals	2	10	8	12	6	14	6	14	6	16
Petrol-Prod.	0.3	4	2	3	10	5	11	3	10	6
Non Met. Min.	0.5	2	1	2	5	2	7	2	6	2
Basic Metals	0.3	7	11	8	17	7	11	6	11	8
Metal Prod.	0.5	5	1	4	3	10	3	6	3	2
Machinery	0.4	19	0.1	19	0.7	17	0.6	19	1	21
Electrical	0.3	8	0.6	7	2	9	2	11	2	11
Transport Eq.	1.2	21	0.3	20	0.7	16	0.6	18	1	14
Miscellaneous	1.1	1.7	2	1.6	0.8	1.1	0.9	1	1	1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AD	153.4		117.8		116.2		120.6		113.8	

AD = sum of the absolute differences between the Greek and UK distributions.

Source: Greece_ Centre of Planning and Economic Research in Athens. UK_ "CSO, Input-Output Tables for the UK", years 1963 and 1968; "Overseas Trade Analysed in Terms of Industries", Business Monitor M10, years 1974, 1978, 1984

- *Exports*

Table 6.6 shows the percentage distributions of exports in Greek and UK manufacturing industries in the benchmark years 1963, 1968, 1974, 1978 and 1984.

The food industry and textiles had among the highest shares in the total exports and output (see table 3.2) of the Greek manufacturing over the entire period examined. Most noticeable is the decline of the share of Greek tobacco industry from 49 per cent of total exports in 1963 to only 5 per cent in 1984; that was mainly due to changing preferences of foreigners in favour of non oriental tobacco that Greece mainly produces.[2]

Since 1968 the share of exports of the Greek basic metals industry has been among the top five exporters in manufacturing industry overall. Furthermore, between 1974 and 1984 the petrol and products of the petroleum industry (a newly established industry where a lot of capital had been invested) has increased substantially its share of exports in the total.

In the UK, the industries that had the largest shares in total exports (in output as well, see table 3.2) during 1963-84 were manufacture of machinery, transport equipment, chemicals, electrical machinery and basic metal industries. In 1974 the portion of exports of manufacture of metal products in total exports rose rapidly in the UK but decreased in the next benchmark years. In 1963 the export performance of the textiles industry ranked fourth place in the UK. However, in 1984 it represented only 4 % of the exports of UK manufacturing lowering its ranking to seventh place.

The sum of the absolute differences between the two distributions can be seen at the bottom of table 6.7 over different benchmark years. It has already been explained in chapter three that the differences in the percentage shares of Greek and UK distributions can range in value from 200 (complete dissimilarity) to 0 (complete similarity). The results given in table 6.6 concerning the absolute differences indicate that there has not been a great similarity between the percentage distributions of exports of the two manufacturing industries during the whole examined period. That is expected since the exports of Greek industry (being a developing industry) concentrated mostly on consumer goods such as food and textiles. While the UK (being a mature industry having passed an industrial revolution) concentrated mostly on capital goods such as machinery and transport equipment.

Therefore, a greater similarity was found between the Greek and UK industries in respect of the structure of imports (table 6.4) than exports. But still the absolute differences, being demonstrated in table 6.6, showed that the structure of the two industries in respect of exports was more similar in 1984 than in 1963 indicating a tendency of convergence between Greek and UK industries.

Table 6.7

Correlation coefficients between the percentage distributions of output and exports in Greek and UK manufacturing industries, 1963-84.

	Correlation Coefficient	
Period	GR	UK
1963-68	0.39 (s)	0.92 (s)
1968-74	0.50 (s)	0.91 (s)
1974-78	0.64 (s)	0.88 (s)
1978-84	0.72 (s)	0.93 (s)
1963-84	0.74 (s)	0.88 (s)

s = significant at the 5 % level of significance.

source: tables 3.2 and 6.6.

Table 6.7 shows that there is a positive and significant association relating the percentage distributions of output and exports in both manufacturing sectors, the association being stronger in the UK. It is apparent from table 6.7 that in Greece the correlation coefficients, though significant, were not as high in 1963 and 1968. Not surprisingly, as at that time there were few products that Greece was exporting. Gradually more products were exported so that the similarity of the distributions of output and exports was getting closer.

Table 6.8

PERCENTAGE CHANGE OF MANUFACTURED EXPORTS IN GREEK AND UK INDUSTRIES, 1963-84. (1974 CONSTANT PRICES)

	1963-68		1968-74		1974-78		1978-84		1963-84	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	52	12	74	76	49	29	23	-2	382	146
Beverages	108	82	-0.7	18	30	18	-18	-11	120	124
Tobacco	-23	34	-14	35	-1	58	-21	24	-48	255
Textiles	19	4	136	23	23	-3	28	-29	344	-12
Footw. Wear.	663	98	758	-20	92	62	103	-9	25322	133
Wood-Cork	27	20	1248	67	6	30	-2	8	1686	180
Furniture	746	28	40	239	193	74	-50	-24	1633	472
Paper-Prod.	264	17	193	107	-16	10	158	2	2197	168
Print. Publ.	-0.3	45	82	-31	-14	43	133	18	265	69
Leather	69	42	117	11	12	11	-8	0	279	75
Rub. Plastics	75	16	419	73	64	25	25	41	1764	254
Chemicals	623	50	63	90	37	16	39	7	2141	253
Petrol-Prod.	772	13	1389	130	41	-20	21	68	22181	248
Non Met. Min.	209	28	981	52	105	25	8	-2	7273	138
Basic Metals	5333	30	279	35	-13	-0.4	29	41	22962	146
Metal Prod.	166	7	692	253	21	-36	34	-58	3305	3
Machinery	-40	18	919	49	17	27	89	10	1251	144
Electrical	252	7	470	99	82	38	-15	2	3009	199
Transport Eq.	-65	13	477	25	10	37	24	-27	172	41
Miscellaneous	119	16	15	30	48	2	56	-31	480	6
Total	42	21	136	58	32	16	29	-2	467	117

Source: as table 6.6.

Table 6.8 shows the percentage change of exports in Greek and UK manufacturing industries between 1963 and 1984. It is apparent from this table that total manufactured exports grew nearly four times faster in Greece than in the UK.

The exports of Greek manufacturing rose faster during the first two sub-periods 1963-68 and 1968-74 than since; this is in accordance with other studies.[3,6]

The industrial policies of the Greek government influenced the rapid increase of exports, during 1963-68. Loans and advances to manufacturing increased in the same period, influencing the increase of investments, capital stock (see chapter 4, table 4.3) and output (see chapter three, table 3.5).[6,16] Furthermore, there were laws introduced providing duty exemptions, tax deductions based on gross receipts from exports and reduced interest rates for export industries.

The vigorous promotion of exports of manufactured products, through tax exonerations or direct assistance to the exporting firms in the form of low interest financing, especially for the facilitation of long-term financing, continued in the period 1968-74. These factors largely influenced the very rapid increase of investments (see appendix two), capital stock and production. Between 1968 and 1974 Greek manufacturing industry realized its highest growth rate of exports over the entire period examined.[17,6]

Although home demand increased and bank credit expanded during the period 1974-78, the exports of Greek manufacturing increased by only 32 per cent (table 6.8) largely influenced, negatively, by the oil crisis of 1973/74 that increased the prices of raw materials and oil and affected the world economy. Furthermore, the 1973 Cyprus incident brought a political instability and uncertainty in the country and investment dropped that year, only to increase sharply in the following year (see appendix two). During 1974-78 labour costs increased rapidly (see chapter 4, table 4.25) in the Greek manufacturing.[18]

During the last sub-period examined, 1978-84, the growth of exports decelerated even further in relation to the previous periods examined, largely due to the second oil crisis as well as increases of labour costs and unit labour costs (see chapter 4, table 4.26) that influenced negatively the Greek manufacturing industry.[19] The drachma devalued in 1983 and exports increased between 1983 and 1984.[20]

Table 6.8 shows that the five Greek industries that enjoyed the fastest growth in terms of exports during the entire period examined, 1963-84, were footwear and wearing, basic metal industries, petrol and products, non metallic minerals and metal products. The exports of tobacco industry declined by 48 per cent between 1963 and 1984.

Data for the UK in table 6.8 indicates that, as in Greek manufacturing, exports of UK manufacturing have increased faster over the first two sub-periods than since.

Exports grew by 21 per cent in UK manufacturing between 1963 and 1968. There was a sharp upturn of exports in 1968 influenced by the 1967 devaluation of the sterling. Furthermore, the recovery of exports that year (14.1 % increase of exports between 1967 and 1968) was largely due to shipments of goods that were delayed before, due to the dock strikes.[12]

The competitive edge given by the 1967 devaluation helped retain the growth of exports of UK manufacturing in 1969. Exports rose by 58 per cent during 1968-74 as table 6.9 shows. Over this period of time unit labour costs increased rapidly (see chapter 4, table 4.26).

The 1973 oil crisis brought UK manufacturing under the impact of the external supply shock, the decline in world demand, and the explosion of inflation particularly in 1974/75.[13] Sterling depreciated in 1976 and exports increased the following year. But the growth of exports of UK industry in 1974-78 was only one third of the previous sub-period largely due to the oil crisis (table 6.8).

The second oil crisis in 1979, that brought a world recession, in relation to other internal factors such as the increase of unit labour costs in 1980, contributed to the deceleration of growth of exports of UK manufacturing in 1981. Sterling depreciated in 1981 and unit labour costs fell.[14,21] But UK exports did not respond immediately and increased by 7.5 % (see figure 6.2) between 1983 and 1984 largely affected by the world recovery.[21] But although exports increased since 1983 exports decreased by 2 % between 1978 and 1984 (table 6.8).

Table 6.8 shows that the five UK industries that enjoyed the fastest expansion of exports were as follows: furniture and fixtures, tobacco, rubber and plastics, chemicals and manufacture of products of petroleum and coal. Textiles industry's exports declined in the UK by 12 per cent between 1963 and 1984.

Both Greek and UK manufacturing industries realized their fastest growth of exports between 1968 and 1974. In both industries the manufacture of products of petroleum and coal was among the most prolific during the entire period examined. Exports of industries such as footwear and wearing, basic metal industries, metal products and non-metallic minerals grew much faster in Greece while the exports of tobacco industry grew faster in the UK than in Greece during the whole examined period.

To sum up, exports grew in Greece nearly four times faster than in the UK across the period 1963-84. It has been obvious from figures 6.3 and 6.4 and particularly table 6.8 that there was a tendency towards convergence between Greek and UK industries in association with export performance.

Table 6.9

Correlation coefficients between the rates of growth of exports of Greek and UK manufacturing industries, 1963-84.

Period	Correlation Coefficient
1963-68	0.08 (ns)
1968-74	0.16 (ns)
1974-78	0.44 (s)
1978-84	0.05 (ns)
1963-84	0.11 (ns)

s= significant at the 5 per cent level

ns= not significant at the 5 per cent level

source: table 6.8

Table 6.9 shows that only in the period 1974-78 the association relating the rates of growth of exports between Greece and the UK was significant indicating similar patterns of growth. Over the entire period examined the correlation coefficient proved to be insignificant, indicating that the patterns of growth of exports of the two manufacturing sectors were different. This reinforces research findings that Greek and UK industries did not mirror the same growth cycle of exports, since exports increased much faster in Greece than in the UK, showing tendency towards convergence between the two industries.

- *Imports in relation to exports*

This sub-section studies the association between imports and exports during 1963-84. This relation is examined through the export/import ratio that is considered a measure of competitiveness in foreign trade. As Campbell-Boross and Morgan say:

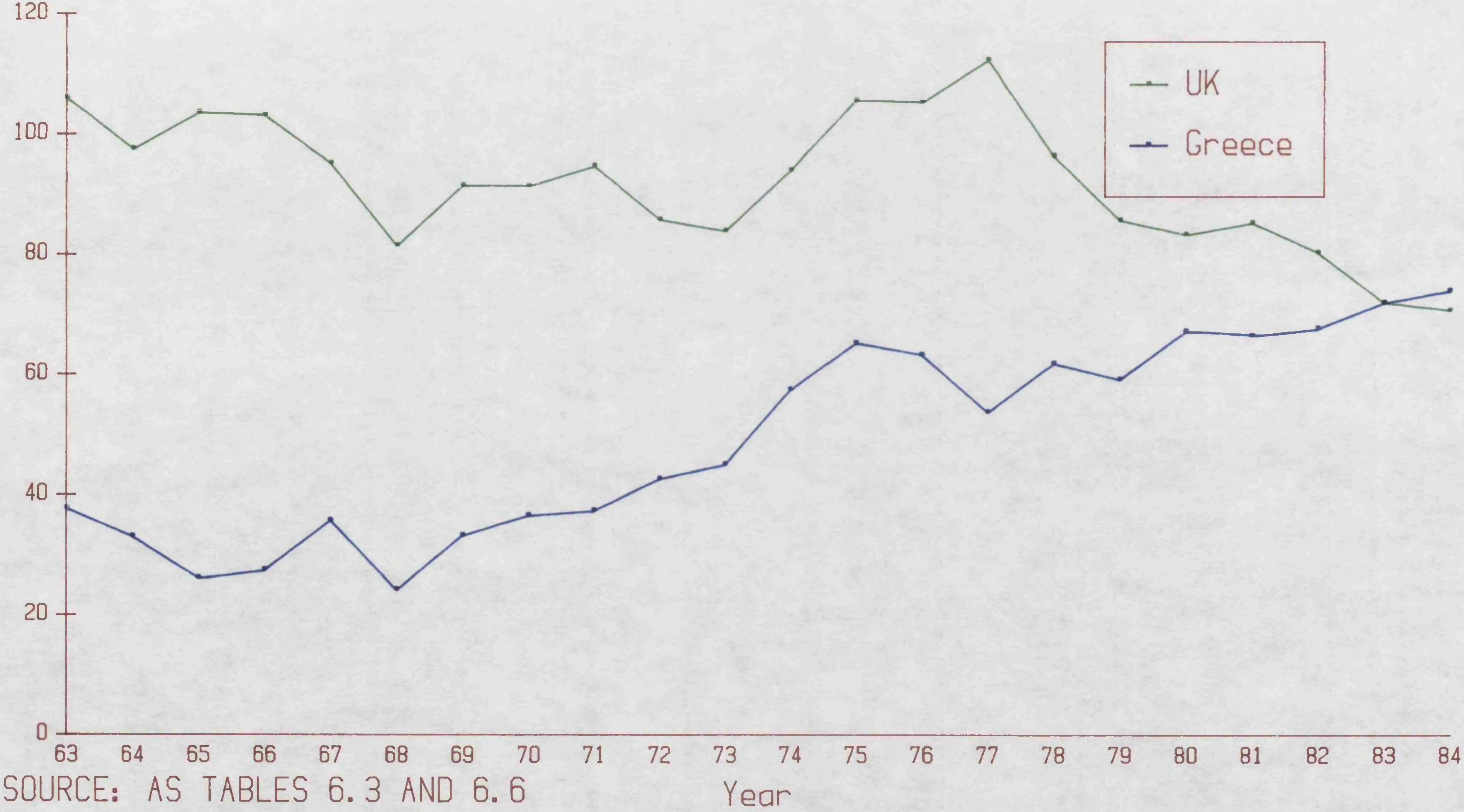
> "... an improvement in competitiveness may show up either in a higher growth of exports than of imports, or in a more decline of imports than of exports."[22]

Therefore the export/import ratio has been estimated being based on 1974 constant prices. Figure 6.5 shows this ratio in percentages for both Greek and UK manufacturing sectors.

Figure 6.5 shows that the export/import ratio was very low in Greece between 1963 and 1968; over that period Greek manufacturing industry depended a lot on manufactured imports and capital goods in order to set the basis for its industrialization and development.[6] Since then there has been a more or less continuous increase of the export/import ratio and between 1963 and 1984 it grew by 97.1 %. Therefore, it can be said that Greek manufacturing industry improved its trade competitiveness between 1963 and 1984 although it is still far from satisfactory.

In the UK manufacturing industry the situation was different to that of Greece. In 1963 there has been a surplus in the balance of trade of manufactured goods, in the UK.

FIGURE 6.5 EXPORTS/IMPORTS (%)



SOURCE: AS TABLES 6.3 AND 6.6

In 1968 the association between imports and exports worsens in the UK (in relation to the previous years) although in 1967 sterling devalued. But as was already explained the not immediate steep deceleration of growth of imports in 1968 was largely due to the "J-curve" response and the reflationary measures that the government adopted between 1963 and 1965 that stimulated consumption.

Between 1968 and 1977 the trend of the export/import ratio was upwards in the UK particularly during 1974-77, influenced by the deceleration of growth of unit labour costs (see table 4.26) and devaluation of the sterling. Since 1977 there has been a more or less continuous decrease of the export/import ratio indicating that UK had greater tendency to import than export; this is in agreement with others.[23]

It is interesting to see that although in 1963 the export/import ratio was by far greater in the UK than in Greece, there has been a tendency towards convergence since then and in 1983 and 1984 the export/import ratio in Greece surpassed that of the UK. Over the entire period examined, 1963-84, the trade competitiveness deteriorated in the UK while it improved in Greece.

In order to examine whether there has actually been a convergence in relation to export/import ratios between Greece and the UK a regression analysis was run regressing the absolute differences between the export/import ratios in the two countries against time. The equation found looks as follows:

The absolute differences between the Greek and UK export/import ratios regressed against time, 1963-84

$$Y = 48.4 \; - 3.33\,T \qquad\qquad R^2 = 0.75$$
$$(-7.84) \qquad\qquad d = 1.83$$

where Y represents the absolute differences between the export/import ratios in Greece and the UK; T is time, covering the period 1963-84; t-statistics are in the parenthesis and $t = 2.086$ at a 5% level of significance, a two-tail test.
Source: as tables 6.3 and 6.6.

It is apparent from the above equation that there has been a convergence between Greek and UK manufacturing industries in terms of export/import ratios during the period 1963-84. This is shown by the negative and significant coefficient in time indicating that the differences of these ratios between the Greek and UK industries got smaller over the period 1963-84.

E. IMPORT PENETRATION, EXPORTS IN RELATION TO OUTPUT AND TRADE COMPETITIVENESS

- *Import ratios*

This section examines the import penetration of manufactured goods in Greece and the UK. The import ratios are estimated and are defined as the percentage share of imports in domestic consumption which is calculated by adding imports to gross output and subtracting exports.[24] The import ratios are based on 1974 constant prices (drachmas for Greece and sterling for the UK).

It is apparent from table 6.10 and figure 6.6 that the import penetration of total Greek manufacturing industry was expanding during 1963 and 1968. This was expected as the development of manufacturing industry depended a lot on manufactured imports particularly on capital goods such as machinery in order to develop itself.[25]

Furthermore, tax deductions based on gross receipts from exports, loans and advances to the private sector in Greece and particularly to manufacturing, increased and largely influenced the increase of investments (appendix two) and capital stock (chapter 4, table 4.3) during 1963-68.[6] In 1968 the loans to manufacturing industry, though, have not been used only for the imports of capital goods but also for consumer goods that increased rapidly (in relation to their 1963 level) as table 6.10 indicates, this is in accordance with other studies.[16]

Table 6.10

IMPORT RATIOS BY MANUFACTURING INDUSTRY IN GREECE AND THE UK, 1963-84.(1974 CONSTANT PRICES)

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	19.0	27.3	25.5	24.1	13.5	20.7	14.3	19.3	24.8	20.5
Beverages	1.5	5.5	3.9	10.1	2.7	7.5	2.2	7.1	4.4	19.4
Tobacco	2.3	0.2	0.5	1.5	1.6	3.4	3.2	3.6	12.7	7.8
Textiles	21.5	15.2	25.3	19.3	13.5	22.7	11.9	31.0	18.9	45.6
Footw. Wear.	5.8	10.2	6.1	16.5	4.8	18.7	5.9	27.0	12.5	42.6
Wood-Cork	33.9	12.7	40.1	3.1	16.4	2.4	16.0	3.1	17.4	3.6
Furniture	1.2	30.4	3.6	48.3	1.7	47.2	2.7	44.3	4.4	49.7
Paper-Prod.	39.6	26.9	43.2	27.9	34.7	28.8	32.0	29.1	34.1	37.5
Print. Publ.	3.2	3.0	6.1	3.9	3.1	3.6	4.7	4.3	3.2	6.2
Leather	3.2	20.7	4.2	25.8	35.6	25.1	47.8	33.7	52.7	57.5
Rub. Plastics	26.9	6.8	28.6	6.7	11.2	9.9	12.7	13.7	11.6	26.5
Chemicals	55.8	14.5	56.9	16.2	41.4	20.4	41.1	25.0	42.3	32.5
Petrol-Prod.	33.9	25.0	36.6	25.8	13.9	14.3	21.3	17.9	11.3	28.1
Non Met. Min.	11.7	4.4	13.5	4.9	7.1	7.8	9.1	8.6	8.9	12.2
Basic Metals	61.9	14.1	61.7	18.7	43.4	20.9	34.0	22.1	27.9	40.8
Metal Prod.	23.6	4.3	39.2	23.9	18.2	26.9	14.5	18.2	12.4	15.7
Machinery	73.8	14.1	78.7	23.0	71.2	26.8	66.1	34.5	77.1	59.0
Electrical	50.9	6.2	52.6	13.8	37.2	24.6	37.5	34.8	35.8	41.6
Transport Eq.	54.4	3.2	71.2	14.8	51.9	18.2	62.4	39.7	36.7	43.1
Miscellaneous	64.4	17.3	70.3	5.9	49.3	9.4	56.0	9.3	65.1	17.7
Total	32.0	13.5	39.2	18.4	26.3	19.7	25.1	23.7	25.9	32.7

Source: 1) exports and imports as tables 6.3 and 6.6. 2) gross output: Greece_ "Yearbook of Industrial Statistics" for years 1963-78; data for 1984 is estmated. UK_ "Business Monitor, Census of Production, Summary Tables ", for 1963; rest of the years from "Yearbook of Industrial Statistics", OECD.

Between 1968 and 1981 the level of import penetration was falling (there has been an increase between 1972-73 due to the oil crisis) in Greece more or less continuously, rose during 1981-83 and decreased between 1983 and 1984. Import penetration of manufactured goods diminished by 19.1 % in Greece between 1963 and 1984. The largest import ratios changes in Greek manufacturing industry occurred in manufacture of machinery, miscellaneous, transport equipment and chemicals during 1963-84.

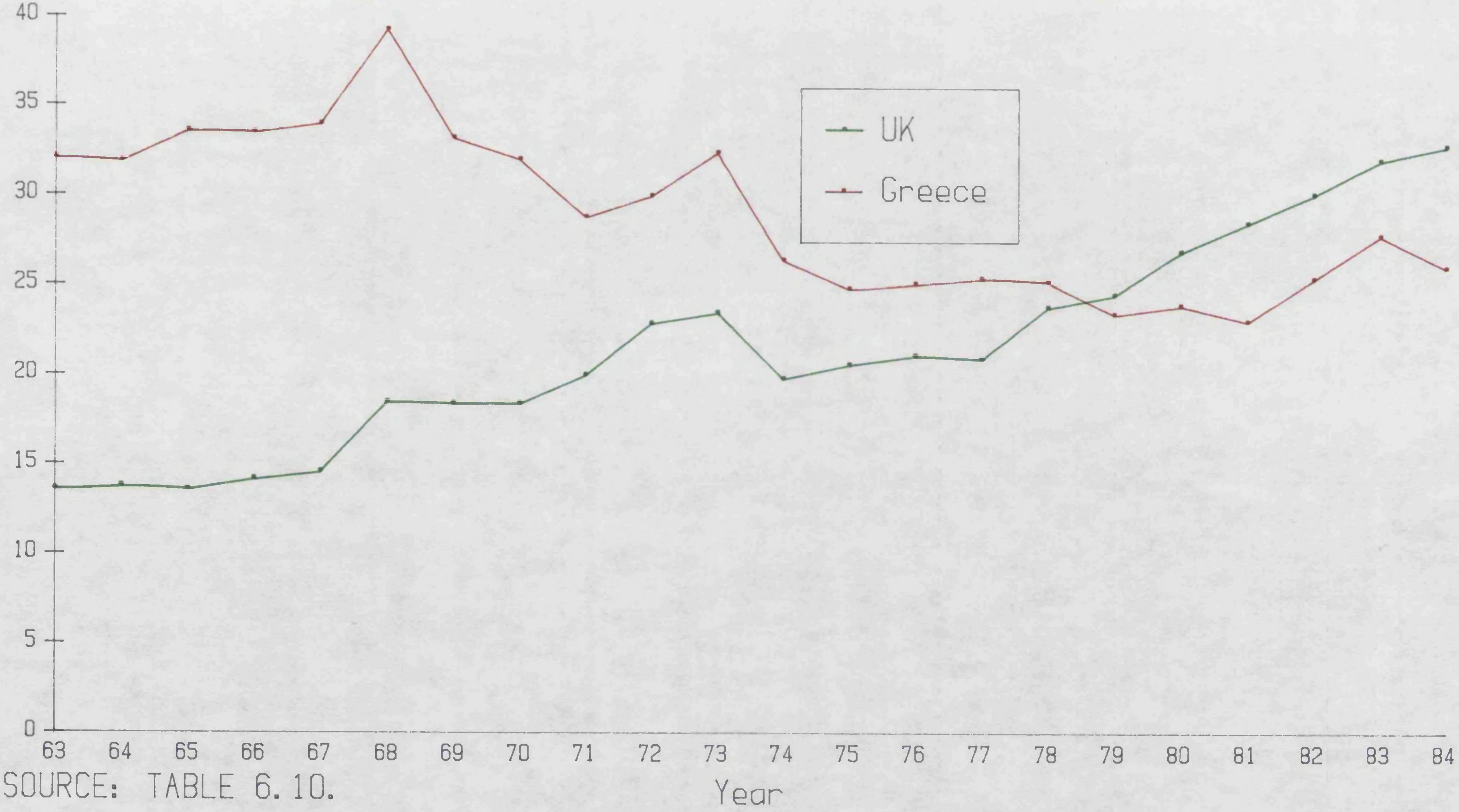
Table 6.10 and figure 6.6 show that import ratios of total UK manufacturing were increasing during 1963-84. There was a long-term rise in UK import penetration and a particular fast rise in the period 1978-84.

According to the OECD[11] capital goods imports rose slightly in the UK in 1963 largely due to the lag in the investment boom though imports of consumer goods increased faster. But the reflationary policies that UK government introduced between 1963 and 1965 influenced largely the increase of investment (see appendix two) and consumption and therefore there has been an increase of imports as well as import ratios between 1963 and 1968 of consumer and capital manufactured goods.

During 1968-74 the import penetration of total UK manufacturing grew, but not as fast as in the previous period 1963-68, due to faster increase of exports in comparison to imports realized at that time (see tables 6.4 and 6.8).

The import penetration in the UK rose between 1974 and 1984, confirmed by other studies.[26] There has been a steep rise of import ratio of total UK manufacturing between 1978 and 1984.

FIGURE 6.6 IMPORT PENETRATION (%)



SOURCE: TABLE 6.10.

The increased private consumption (5.9 % rise between 1978 and 1984) in the UK which was associated with a fall in the savings ratio as well as the miners' strike are the main reasons for the rapid increase of imports between 1978 and 1984. OECD[4] argues that:

> "Consumers'expenditure, which grew rapidly from the middle of 1982 to the end of 1983, was the main support to demand growth until 1984. Despite the slight recovery in personal disposable incomes during 1983, the rapid growth in consumption was associated with increased borrowing and strong dissaving."

Table 6.10 shows that indeed the import ratio of petrol and products industry increased in the UK over 55 per cent during 1978-84.

During 1963-84 import penetration increased in the UK due to the decline in the competitiveness of UK manufactures.[27,23]

Table 6.10 indicates that in the UK the greatest import penetration was achieved in furniture and fixtures, leather and fur and since 1974, machinery.

Comparing the performance of the import ratios in both countries figure 6.6 shows that the import penetration in total Greek manufacturing was far greater than in the UK between 1963 and 1973. Since then there was a tendency of convergence and the gap narrowed. From 1979 onwards the import penetration in the UK exceeded that of Greece. Over the period 1963-84 import penetration decreased in Greece by 19.1 % while it increased in the UK by 142.2 %.

Hence, it can be said that in terms of import penetration Greek industry improved its position by controlling the growth of its imports while the reverse was true for UK manufacturing industry.

Table 6.10 shows that there were Greek industries such as chemicals, machinery and appliances, wood and cork, and miscellaneous that experienced greater import penetration than in the UK during 1963-84. The industries that experienced higher import penetration in the UK in comparison to Greece over the entire period examined were furniture and fixtures, beverages and footwear and wearing. Table 6.10 shows that the import penetration of the UK industries machinery and appliances, and transport equipment increased between 1974-84.

Table 6.11

Correlation coefficients between the import ratios of Greek and UK manufacturing industries, 1963-84.

Year	Correlation Coefficient
1963	0.08 (ns)
1968	-0.01 (ns)
1974	0.25 (ns)
1978	0.45 (s)
1984	0.49 (s)

s= significant at the 5 per cent level

ns = not significant at the 5 % level of significance.

Source: table 6.10.

Table 6.11 shows the association between the import ratios of the two manufacturing sectors during 1963-84. The correlation coefficients were not significant in 1963, 1968 and 1974 indicating dissimilar structure of the import ratios of the two industries. The correlation coefficients were proven to be significant in 1978 and 1984 due to greater similarity of the import ratios of the two countries.

- *Export ratios*

The purpose of this section is to examine the proportion of output that has been exported in both Greek and UK manufacturing industries between 1963 and 1984. Therefore, the export ratios are estimated and are defined as exports divided by gross output, both being at 1974 constant prices (drachmas for Greece and sterling for the UK). Table 6.12 shows the export ratios for Greek and UK manufacturing industries in benchmark years 1963, 1968, 1974, 1978 and 1984 at a disaggregate level and figure 6.5 exhibits the export ratios of Greek and UK manufacturing sectors at an aggregate level during 1963-84.

Figure 6.7 and table 6.12 show that during 1963-84 the export ratio increased in Greece by 36.4 %. There has been a decrease of the export ratio between 1963 and 1968 and the fastest rise of the export ratio in Greece was between 1968 and 1974 (table 6.12) as exports were increasing at a faster speed than production (see chapter 3) and import penetration was shrinking (see table 6.10). It has already been said that government policies such as tax exonerations and low interest financing of the exporting firms influenced the rapid growth of exports between 1968 and 1974 in Greece.

What are the reasons behind the rise of the export ratio in Greek industry during 1963-84?

Table 6.12

EXPORT RATIOS BY MANUFACTURING INDUSTRY IN GREECE AND THE UK, 1963-84.(1974 CONSTANT PRICES)

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	14.0	4.4	15.2	4.0	16.1	5.6	16.1	7.0	23.4	7.0
Beverages	9.9	8.0	10.6	17.7	7.6	11.2	6.8	12.3	6.5	22.9
Tobacco	97.4	1.5	69.9	7.4	64.2	10.8	44.1	14.5	41.4	25.7
Textiles	15.9	17.3	13.5	19.1	16.4	23.2	16.0	27.4	22.6	31.3
Footw. Wear.	1.1	7.0	5.1	13.7	26.7	9.8	35.7	17.6	50.0	20.4
Wood-Cork	0.7	2.8	0.6	0.6	3.9	0.6	4.2	1.0	5.1	1.4
Furniture	0.2	1.5	0.7	3.2	0.8	7.9	2.0	14.3	1.3	11.5
Paper-Prod.	1.1	5.6	2.2	5.6	3.5	7.9	3.0	10.3	6.0	12.0
Print. Publ.	2.1	7.7	1.5	9.6	1.7	5.5	1.2	7.5	2.0	7.9
Leather	21.8	20.0	27.8	29.3	41.7	31.1	53.8	32.0	28.4	49.9
Rub. Plastics	1.6	11.6	1.4	10.1	3.3	12.3	4.5	15.4	4.3	20.7
Chemicals	5.1	17.7	17.8	19.8	13.9	25.3	16.2	31.1	19.1	34.6
Petrol-Prod.	1.1	18.0	6.4	15.6	25.1	12.8	28.7	15.3	21.5	18.7
Non Met. Min.	1.4	8.5	2.5	8.8	14.4	11.1	20.0	12.9	21.9	12.8
Basic Metals	2.0	11.0	38.2	12.3	38.6	14.0	29.7	18.0	30.3	35.7
Metal Prod.	1.5	11.4	2.4	11.1	10.2	29.7	8.6	19.5	9.2	12.1
Machinery	2.5	27.6	0.8	30.1	4.7	35.9	4.9	44.2	14.1	57.0
Electrical	1.3	17.0	2.0	15.4	6.3	24.7	10.2	36.2	9.0	33.5
Transport Eq.	5.7	24.7	1.3	27.0	4.0	30.8	3.3	41.5	2.7	36.0
Miscellaneous	21.5	27.0	27.8	8.6	17.0	10.1	18.3	9.4	30.3	10.9
Total	15.1	14.2	13.5	15.5	17.0	18.7	17.2	23.0	20.6	25.6

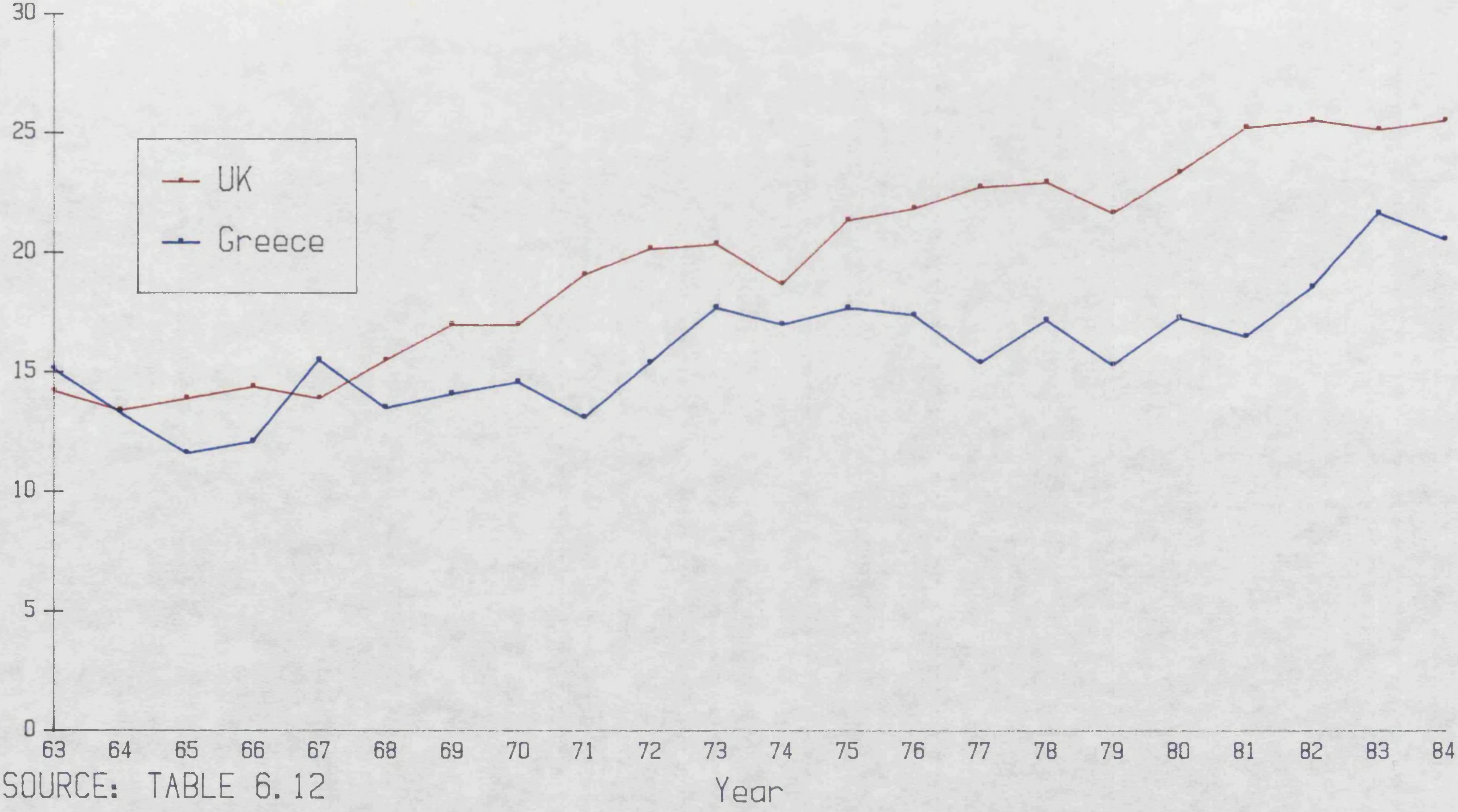
Source: as table 6.10.

According to the Kaldor effect[28] the tendency for an increase in import penetration leads to a rise in the export ratio via a reduction in the growth rate of output. In this case import penetration needs to be defined as the ratio of imports to output (and not as imports/(output + imports - exports) analogous to the export ratio. But estimating import penetration as imports to output for both Greece and the UK, the trend of growth of import penetration did not differ.

Examining whether the Kaldor effect did hold in the case of Greek industry over the period 1963-84 the answer is negative. Import penetration decreased by 19.1 % (or decreased by 30.9 % if import penetration is estimated as imports to output) while export ratio rose by 36.4 % and gross output by 315.5 % (not to be confused with gross domestic product which increased by 274 % in Greek manufacturing during 1963-84).

Therefore, it can be said that the growth of export ratio, during 1963-84, in Greek manufacturing was attributed to the much faster growth of exports (467 % rise) in relation to gross output (315.5 % increase). Furthermore, over the same period of time, import penetration decreased while output increased in Greek industry.

FIGURE 6.7 EXPORT RATIOS (%)



SOURCE: TABLE 6.12

Looking at the different Greek industries, table 6.12 shows that footwear and wearing industry was exporting only 1.1 per cent of its output in 1963 when in 1984 it was exporting 50 per cent, due to faster growth of exports in relation to output. Basic metals industry increased its export ratio in Greece from 2 per cent in 1963 to 30.3 per cent in 1984 for the same reason as above. But tobacco industry in Greek manufacturing which was exporting 97.4 per cent of its output in 1963 was exporting only 41.4 per cent in 1984, that was largely due to changing preferences of foreigners in favour of non oriental tobacco that Greece mainly produces.[2]

The industries that exported most of their output in Greece during 1963-84 were tobacco, leather and fur (due to faster rise of exports in relation to output) and since 1968 basic metals as well.

Turning to the UK, table 6.12 and figure 6.7 exhibit that the export ratio in UK manufacturing increased by 80.3 % between 1963 and 1984 and its fastest rise was between 1974 and 1978.

According to the Kaldor effect the greater the increase in the import ratio the lower the rate of growth of output, and the lower the rate of growth of output the greater the increase in the export ratio.[28] Is this true for UK industry ?

The greater increase of the import penetration (38 % rise or 51.5 % rise if import penetration is estimated as the ratio of imports to gross output) in UK industry was between 1978 and 1984 when gross output decreased by 11.9 % while export ratio rose by

11.3 %. Therefore the rise of export ratio between 1978 and 1984 was attributed to the fall of output and this supports the existence of a Kaldor effect.

Over the entire period examined the export ratio in UK manufacturing increased by 80.3 % while import penetration rose by 142.2 % (or by 170.1 % if import penetration is defined as the ratio of imports to output) and gross output by 20.7 %. Therefore, it cannot be said that the improvement of the export performance in UK manufacturing industry, during 1963-84, was entirely due to the increase in import penetration via a reduction in the growth of output. But it can be said that import penetration in the UK, over the entire period examined, grew at a much faster rate than export performance, this is in agreement with other studies.[23,28]

Examining different UK industries, the tobacco industry whose export ratio was only 1.5 per cent in 1963 reached 25.7 per cent in 1984 due to increase of exports while output fell. Furthermore, the furniture industry increased its exports in relation to output from 1.5 per cent in 1963 to 11.5 per cent in 1984 due to fall of output owed to import penetration (Kaldor's effect supported). Miscellaneous manufacturing industries in the UK faced a decrease of their export ratio from 27 per cent in 1963 to 10.9 per cent in 1984.

During 1963-84 the UK industries with the highest export ratios were as follows: machinery, leather and fur, and transport equipment; their high export ratios are mainly to be explained by the failure of gross output to grow fast because of import penetration (see table 6.10).

Comparing the growth of export ratios of Greek and UK manufacturing sectors, it is apparent that the export ratio in the UK grew by 80.3 % while in Greece there has been a 36.1 % rise. But import penetration decreased, over the entire period examined, in Greece while in the UK increased at a much faster rate than the export ratio. Hence, the analysis so far has shown that there was a tendency towards convergence between Greek and UK industries in respect of trade performance. Furthermore, the trade performance of Greek industry improved while it deteriorated in the UK during 1963-84 and therefore Greek and UK industries did not pursue similar growth cycles.

Leather and fur was the common industry among those with the highest export ratios in both countries during 1963-84.

There were industries which export ratios were much higher in Greece than in the UK during the entire period examined such as tobacco, food industries and since 1968 footwear and wearing. The industries in which export ratios in the UK were greater than in Greece during 1963-84 were the following: machinery, transport equipment and rubber and plastics.

Table 6.13

Correlation coefficients between the export ratios of Greek and UK manufacturing industries, 1963-84.

Year	Correlation Coefficient
1963	-0.17 (ns)
1968	-0.03 (ns)
1974	0.02 (ns)
1978	0.07 (ns)
1984	0.19 (ns)

ns = not significant at the 5 % level of significance.

Source: table 6.12.

Table 6.13 shows the association between the export ratios of Greek and UK manufacturing industries during 1963-84. It is apparent that there has been an insignificant similarity between the export ratios of the two manufacturing industries over the entire period examined.

- *Trade balance ratios*

The trade balance ratio is used as a measure of trade competitiveness. It is defined as the difference between exports and imports, divided by their sum, and can range in value between +1 and -1.[24] The higher the positive ratio, the greater the competitiveness of the industry, and the higher the negative ratio, the greater the lack of competitiveness.

Table 6.14 shows the trade balance ratios (based on 1974 constant prices) in Greek and UK manufacturing industries at a disaggregate level in the benchmark years 1963, 1968, 1974, 1978 and 1984 while figure 6.8 exhibits the trade balance ratios at an aggregate level over the entire period examined.

In 1963 and 1968 most of the Greek manufacturing industries had negative trade balance ratios with the exception of beverages, tobacco and leather and fur. The negative trade balance ratio of total manufacturing in Greece between 1963 and 1968 was due to higher imports in relation to exports; this is confirmed by the findings of tables 6.4 and 6.8.

The rapid deterioration of trade balance ratio of total Greek manufacturing over this period, 1963-68, was mainly due to government policies that through loans and advances stimulated investments (see appendix two) and imports of particularly capital goods that were vital for the development of Greek industry.[3] From 1968 onwards the trade balance ratio of total Greek manufacturing improved due to faster growth of exports in relation

Table 6.14

TRADE BALANCE RATIOS BY MANUFACTURING INDUSTRY IN GREECE AND THE UK, 1963-84.(1974 CONSTANT PRICES)

	1963		1968		1974		1978		1984	
	GR	UK	GR	UK	GR	UK	GR	UK	GR	UK
Food	-0.18	-0.78	-0.31	-0.77	0.11	-0.63	0.07	-0.52	-0.04	-0.55
Beverages	0.75	0.20	0.49	0.31	0.49	0.22	0.52	0.29	0.20	0.10
Tobacco	0.99	0.77	0.99	0.67	0.98	0.55	0.92	0.64	0.66	0.61
Textiles	-0.19	0.08	-0.37	-0.01	0.12	0.01	0.17	0.09	0.11	-0.30
Footw. Wear.	-0.69	-0.20	-0.09	-0.11	0.76	-0.36	0.79	-0.27	0.75	-0.49
Wood-Cork	-0.97	-0.67	-0.98	-0.68	-0.65	-0.59	-0.62	-0.50	-0.60	-0.46
Furniture	-0.77	-0.93	-0.69	-0.93	-0.33	-0.83	-0.15	-0.65	-0.56	-0.77
Paper-Prod.	-0.97	-0.72	-0.94	-0.73	-0.87	-0.65	-0.88	-0.56	-0.78	-0.63
Print. Publ.	-0.21	0.45	-0.63	0.44	-0.30	0.22	-0.59	0.29	-0.24	0.13
Leather	0.79	-0.02	0.79	0.09	0.13	0.15	0.12	-0.04	-0.47	-0.15
Rub. Plastics	-0.91	0.29	-0.93	0.22	-0.57	0.12	-0.51	0.07	-0.49	-0.16
Chemicals	-0.92	0.12	-0.72	0.12	-0.63	0.14	-0.57	0.15	-0.51	0.05
Petrol-Prod.	-0.96	-0.20	-0.79	-0.31	0.35	-0.06	0.19	-0.09	0.36	-0.26
Non Met. Min.	-0.81	0.34	-0.72	0.30	0.38	0.19	0.43	0.22	0.49	0.02
Basic Metals	-0.98	-0.14	-0.45	-0.25	-0.10	-0.24	-0.10	-0.12	0.06	-0.11
Metal Prod.	-0.91	0.48	-0.93	-0.43	-0.32	0.07	-0.29	0.04	-0.16	-0.15
Machinery	-0.98	0.40	-0.99	0.18	-0.96	0.21	-0.95	0.20	-0.91	-0.04
Electrical	-0.97	0.51	-0.96	0.06	-0.79	0.004	-0.68	0.03	-0.70	-0.17
Transport Eq.	-0.90	0.82	-0.99	0.36	-0.93	0.33	-0.96	0.04	-0.91	-0.15
Miscellaneous	-0.74	0.28	-0.72	0.20	-0.65	0.04	-0.70	0.005	-0.62	-0.28
Total	-0.45	0.03	-0.61	-0.10	-0.27	-0.03	-0.23	-0.02	-0.15	-0.17

Source: as table 6.10.

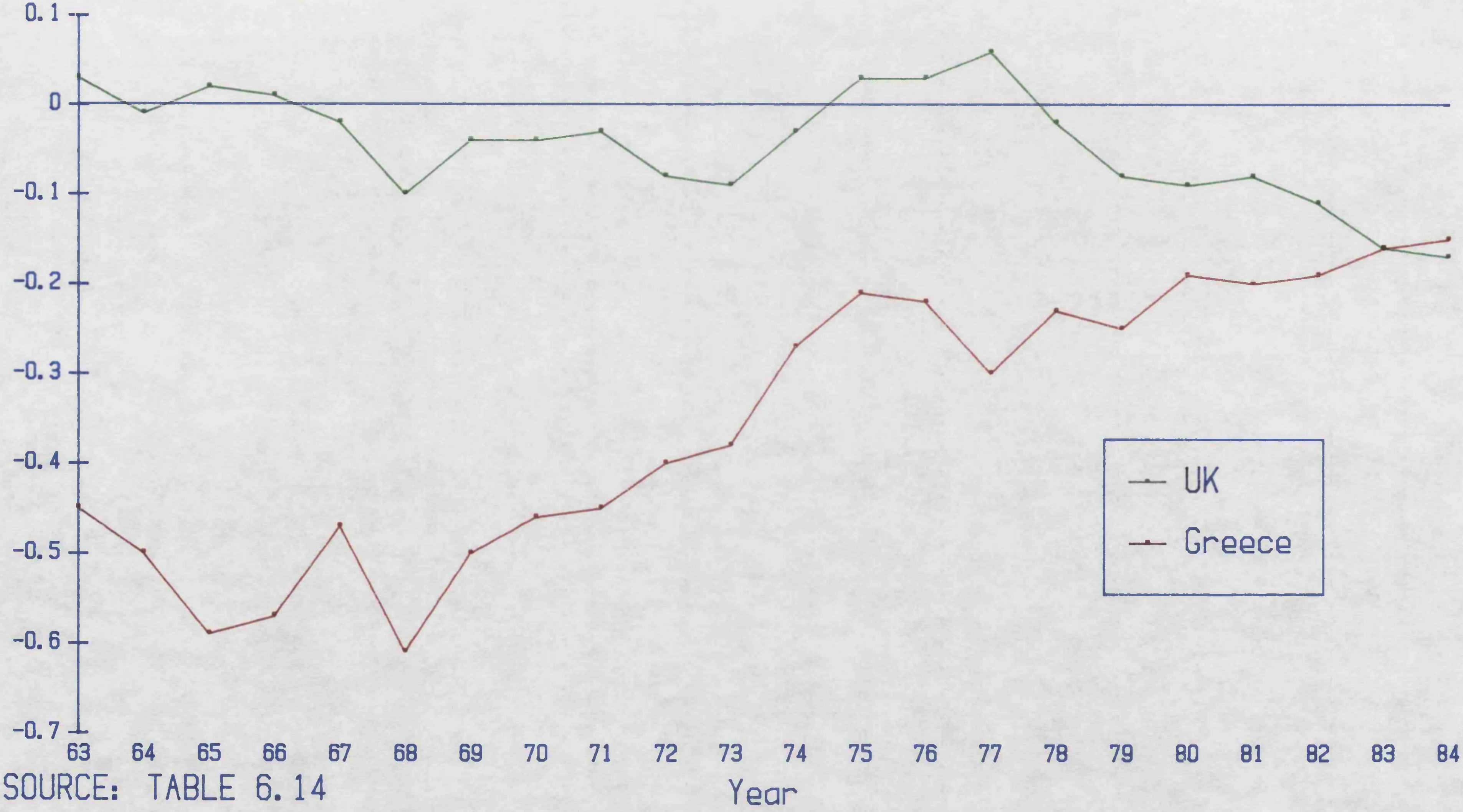
to imports (see tables 6.4 and 6.8) although in 1984 was still far from satisfactory.

Since 1974 new manufacturing industries improved their trade competitiveness in Greece and in 1984 the industries with positive ratios were the following: beverages, tobacco, textiles, footwear and wearing, petrol and products, non metallic minerals, and basic metals.

Table 6.14 shows a very different picture for the UK in comparison to Greece. In 1963 twelve out of twenty industries in the UK had positive trade balance ratios that were the following: beverages, tobacco, textiles, printing and publishing, rubber and plastics, chemicals, non metallic minerals, metal products, machinery, electrical, transport equipment, and miscellaneous.
The trade balance ratio of total UK manufacturing industry was also positive in 1963, although not very high, due to higher level of exports in comparison to imports (see figure 6.2).

In 1968 the trade balance ratio of total UK manufacturing worsened (in comparison to 1963 level) and eleven industries out of twenty had a positive ratio. The deterioration of the trade balance ratio of total manufacturing between 1963 and 1968 was expected as imports increased at their fastest rate in the UK (table 6.4) largely due to reflationary policies that the government introduced such as tax reductions that stimulated consumer demand and growth of imports. Due to this rapid growth of imports in relation to exports the trade deficit widened greatly in the UK over this period of time (figure 6.2).

FIGURE 6.8 TRADE BALANCE RATIOS (%)



SOURCE: TABLE 6.14

There was a slight improvement of trade balance ratio in the UK in 1974 in comparison to 1968 since thirteen industries had positive balance ratios in comparison to eleven industries in 1968. The trade balance ratio of total UK manufacturing in 1978 was not that different to its 1974 level. But in 1984 there was a sharp deterioration of the trade balance ratio of UK manufacturing and only five industries achieved positive trade balance ratios that were: beverages, tobacco, printing and publishing, chemicals, and non-metallic minerals.

The industries that accomplished high positive trade balance ratios in both countries over the entire period examined were tobacco and beverages.

Comparing the trade balance ratios between Greece and the UK it is apparent from table 6.14 and figure 6.8 that UK manufacturing was far more competitive than the Greek between 1963 and 1982 but UK industry deteriorated its trade competitiveness particularly between 1978 and 1984.

To sum up, Greek manufacturing industry ameliorated its trade competitiveness between 1963-84 although still in 1984 its trade performance was far from satisfactory as only seven out of twenty industries succeeded positive trade balance ratios. In the UK the trade competitiveness worsened during 1963-84 and in 1984 there were only five industries with positive trade balance ratios (while in 1963 there were twelve). Furthermore, table 6.14 and figure 6.8 showed that Greek manufacturing industry was more competitive that the UK in respect of trade balance ratios in 1984.

Table 6.15

REGRESSIONS ANALYSES OF THE ABSOLUTE DIFFERENCES BETWEEN THE GREEK AND UK TRADE BALANCE RATIOS AGAINST TIME, 1963-84. (1974 CONSTANT PRICES)

Food	Y = 0.54	- 0.001T	R^2 = 0.02
		(-0.63)	d = 1.49
Beverages	Y = 0.22	- 0.02 T	R^2 = 0.23
		(-2.46)	d = 1.83
Tobacco	Y = 0.10	- 0.02 T	R^2 = 0.21
		(-2.29)	d = 1.74
Textiles	Y =-0.007	+ 0.02 T	R^2 = 0.05
		(1.03)	d = 1.51
Footw. Wear.	Y = 0.08	+ 0.003T	R^2 = 0.003
		(0.24)	d = 1.44
Wood-Cork	Y = 0.09	- 0.01 T	R^2 = 0.16
		(-1.97)	d = 1.58
Furniture	Y = 0.10	+ 0.001T	R^2 = 0.01
		(0.09)	d = 1.84
Paper-Prod.	Y = 0.25	- 0.006T	R^2 = 0.22
		(-2.37)	d = 1.45
Print. Publ.	Y = 0.07	+ 0.002T	R^2 = 0.004
		(0.30)	d = 1.74
Leather	Y = 0.63	- 0.03 T	R^2 = 0.40
		(-3.62)	d = 1.51
Rub. Plastics	Y = 0.39	- 0.01 T	R^2 = 0.26
		(-2.63)	d = 1.49
Chemicals	Y = 0.42	- 0.02 T	R^2 = 0.49
		(-4.41)	d = 2.19
Petrol-Prod.	Y = 0.25	- 0.02 T	R^2 = 0.10
		(-1.49)	d = 1.52
Non Met. Min.	Y = 0.03	+ 0.01 T	R^2 = 0.02
		(0.69)	d = 2.20
Basic Metals	Y = 0.52	- 0.03 T	R^2 = 0.58
		(-5.23)	d = 1.48
Metal Prod.	Y = 0.39	- 0.04 T	R^2 = 0.46
		(-4.16)	d = 1.49
Machinery	Y = 0.41	+ 0.004T	R^2 = 0.12
		(1.64)	d = 1.43
Electrical	Y = 0.32	- 0.02 T	R^2 = 0.27
		(-2.73)	d = 1.44
Transport Eq.	Y = 0.16	+ 0.02 T	R^2 = 0.23
		(2.45)	d = 1.45
Miscellaneous	Y = 0.09	- 0.03 T	R^2 = 0.07
		(-1.28)	d = 1.56

where Y is the absolute difference between the Greek and UK trade balance ratios; T is time, representing the period 1963-84; t-statistics are in brackets and t = 1.325 at a 10% level, t = 1.725 at 5% level and t = 2.086 at a two-tail test.
Source: based on the same sources of data as table 6.14.

The absolute differences between the Greek and UK trade balance ratios were regressed against time in order to test whether a convergence occurred between the two manufacturing sectors. The findings are demonstrated in table 6.15 and all equations are free of autocorrelation.

Table 6.15 makes obvious that there has been a convergence in respect of trade balance ratios between the following Greek and UK industries: beverages, tobacco, wood and cork (at 5% level only and not at a two-tail test), paper and products, leather and fur, rubber and plastics, chemicals, petrol and products (at 10% level of significance), basic metals, metal products, and electrical.

There has not been a convergence between Greek and UK machinery (significant only at a 10% level) and transport equipment industries; Greek industries lack behind their counterparts in the UK. The coefficient in time "b" proved to be insignificant for the rest of the industries.

Considering the total Greek and UK manufacturing sectors, the equation found is as follows:

The absolute differences between the Greek and UK trade balance ratios regressed against time, 1963-84.

$$Y = 0.38 - \underset{(-11.5)}{0.03}\, T \qquad R^2 = 0.87 \quad d = 1.62$$

where Y represents the absolute differences between the trade balance ratios of Greek and UK manufacturing sectors; T represents the time covering the period 1963-84; t-statistics are in the parenthesis and t= 2.086 at a 5 % level of significance, a two-tail test. Source: as table 6.15.

The above equation shows that there has been a convergence between the trade balance ratios of Greek and UK manufacturing industries during the period 1963-84.

Table 6.16

Correlation coefficients between the trade balance ratios of Greek and UK manufacturing industries, 1963-84.

Year	Correlation Coefficient
1963	0.18 (ns)
1968	0.34 (ns)
1974	0.15 (ns)
1978	0.22 (ns)
1984	0.30 (ns)

ns = not significant at the 5 % level of significance.

Source: table 6.15.

Table 6.16 shows the correlation coefficients relating the trade balance ratios of Greek and UK manufacturing industries in benchmark years 1963, 1968, 1974, 1978 and 1984.

It is apparent from table 6.16 that all correlation coefficients are insignificant at the 5 % level of significance. Therefore, there has not been any similarity between the structure of trade balance ratios of the two manufacturing sectors. This confirms what has already been shown that Greek and UK industries did not reflect similar development cycles since Greek industry improved its trade competitiveness while the UK did not.

F. CONCLUSIONS

This chapter examines and compares the performance of Greek and UK industries in respect of imports and exports. In addition, it looks at the factors that influenced manufactured imports and exports in the two countries during 1963-84. But the main focus of this chapter is the study of the convergence hypothesis between the two industries in association with trade performance across the period 1963-84.

At first the imports, exports and trade balances of Greek and UK manufacturing sectors, at an aggregate level, were assessed across the period 1963-84. It was found that the trade balance deficit in both manufacturing industries increased sharply during 1963-68 for reasons that have been highlighted. The trade deficit reached its peak in Greece in 1968 and since then its growth decelerated. In the UK the balance of trade deteriorated between 1963 and 1984. Furthermore, the share of imports and exports in gross domestic product (GDP) in both countries was considered. The share of imports in the GDP rose by 10.3 % in Greece and by 105.8 % in the UK while the share of exports in the GDP increased by 117.7 % in Greece and by 36.7 % in the UK. These findings indicate improvement of trade performance in Greek industry and deterioration in the UK along the entire period examined.

The aggregate import demand and export demand functions for both Greek and UK manufacturing industries were studied across the period 1963-84.

Considering the import demand functions, the price elasticity was found inelastic and significant in Greece while inelastic and insignificant in the UK. Imported manufactured products were found to be elastic with respect to GNP in both countries. Both oil crises (particularly the second) proved to have influenced negatively imports in Greek manufacturing industry. In the UK only the 1973 oil crisis had a negative impact on UK imports while the second crisis did not, since the UK did not depend on imports of fuels as much as before due to further exploration of North Sea oil.

Lagged exports were significant determining factors of manufactured exports in both Greece and the UK. Exports of manufactured goods were found to be foreign income elastic in Greece and inelastic in the UK. It was shown that Greek exports are dependent on export prices while UK exports of manufactured products are not.

The distribution and growth of imports was studied at an aggregate and disaggregate level. The distributions of imports of the two industries were quite similar being most similar in 1978. Imports of the UK manufacturing industry increased faster than in Greece over the entire period examined. It was during 1963-68 that imports expanded faster in both manufacturing industries. Imports rose in the UK over the period 1978-84 influenced by the increase in private consumption and a large increase in fuel imports, between 1983 and 1984, as a result of the miners' strike.

Then the distribution and growth of exports by sector has been examined. It was found a greater similarity between the percentage distributions of imports than exports in Greek and UK manufacturing industries during 1963-84. Over the entire period examined exports of the Greek manufacturing increased nearly four times faster than in the UK. Hence, there was found a tendency towards convergence between the two industries in relation to export performance. Considering the different sub-periods, it was during 1968-74 that both industries succeeded their fastest growth of exports. UK manufacturing realized negative growth of exports between 1978 and 1984 but exports increased during 1983-84.

As a measure of competitiveness in foreign trade the export/import ratio was estimated. In 1963 UK manufacturing industry was far more competitive than the Greek but since then there was a trend towards convergence and in 1983 and 1984 the export/import ratio in Greece was higher than in the UK. The absolute differences between the Greek and UK export/import ratios were studied over time and the findings showed a convergence between the two manufacturing sectors during 1963-84.

The import ratios were estimated being defined as the percentage share of imports in domestic consumption which is calculated by adding imports to gross output and subtracting exports. The results indicated that the import penetration in total Greek manufacturing was far greater than in the UK between 1963 and 1973. Since then the gap narrowed and from 1979 onwards the import penetration in the UK exceeded that of Greece. Over the entire period examined, import penetration decreased in Greece by 19.1 % while it increased in the UK by 142.2 %.

The export ratios (exports/gross output) were then calculated in order to see the proportion of output that was exported in both manufacturing industries. It was found that import penetration in the UK grew at a much faster rate than export performance while in Greece export ratio increased by 36.4 % while import penetration decreased by 19.1 %.

Finally the trade balance ratios were measured for Greek and UK manufacturing industries. The trade balance ratio was used as a measure of trade competitiveness and was defined as the difference between exports and imports divided by their sum. It was found that UK manufacturing was more competitive than the Greek in all years except the last, due to improvement of trade performance of Greek industry and deterioration of the UK. The absolute differences between the Greek and UK trade balance ratios were looked at over the entire period examined. The findings made it obvious that there has been a convergence between the Greek and UK manufacturing sectors in respect of trade performance during 1963-84.

Hence, Greek and UK manufacturing industries followed different patterns of growth in respect of trade performance. It is true that in 1963 the trade performance of Greek industry was very poor in comparison to the UK. But during 1963-84 there has been an improvement of trade competitiveness in Greece while there has been a deterioration in the UK. Between 1963 and 1984 imports increased nearly twice as fast as exports in the UK, while in Greece exports increased over twice as fast as imports. But still both Greek and UK industries have to improve their trade performance in order to eliminate their trade deficits.

To return to the hypothesis of this chapter, the results found, supported a convergence between Greek and UK industries in respect of trade performance. Furthermore, Greek manufacturing industry was found more competitive than the UK in terms of export/import ratio since 1983 and in association with trade balance ratio in 1984.

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CHAPTER SEVEN

CONCLUSIONS

A. SUMMARY AND MAIN FINDINGS

The objective of this thesis was to compare the performance of Greek and UK manufacturing industries at an aggregate and disaggregate level during the period 1963-84 concentrating mostly on the benchmark years 1963, 1968, 1974, 1978 and 1984. The comparative analysis between Greek and UK manufacturing industries is based on the concepts of development theory that intercountry comparisons are important in understanding the economic and industrial conduct and recognising homogeneous features of development.

The main focus of this study was to explore the possibility that there has been a convergence between the patterns of growth in Greek and UK manufacturing industries during 1963-84. The reason to believe this was largely due to Chassid's[1] findings who demonstrated that the structure of Greek and UK manufacturing industries, at a disaggregate level, was very different in terms of labour, gross output and value added in 1963 but in 1968 and 1973 there was a greater similarity between the two manufacturing sectors due to development of the Greek industry to a level more comparable to that of the UK. Furthermore, the very rapid growth of income in Greece, during 1950-62, that Nadiri[2] demonstrated, and the faster average annual rate of growth of gross domestic product and labour productivity in Greece in comparison to the UK during 1960-75, that Chassid[1] exhibited, were grounds to believe that Greece was catching up with the UK in terms of economic and industrial development. Furthermore, preliminary tests that were carried out supported the convergence hypothesis between the two manufacturing industries.

Convergence is generally defined as movement towards the same point. Here it means that Greek manufacturing industry has been growing faster than its counterpart and the differences between the Greek and UK industries have been diminishing in respect of output, capital and labour, capital intensity, capital and labour productivities, labour costs, total factor productivity, and trade performance. The study of Greek and UK manufacturing industries was carried out using NEDO's[3] model.

This thesis examined four hypotheses. There was a convergence between Greek and UK manufacturing industries, over the period 1963-84, in respect of (i) output; (ii) capital and labour, capital intensity, capital and labour productivity, and labour costs; (iii) total factor productivity; and (iv) trade performance.

This project was divided into two large sections. The first section involved the theoretical part of this study and covered chapters one and two. The second section dealt with the statistical part of this project and included chapters three to six, chapter seven referred to the conclusions.

Chapter one highlighted the purpose of this project and outlined the thesis.

Chapter two dealt with the review of literature concerning the measurement and concept of productivity. At first the significance of productivity and general approaches for its estimation were discussed. Then the Verdoorn Law was defined and explored as well as its controversies. Various approaches for estimating productivity of industrial sectors and particularly of manufacturing industries of different countries, including Greece and the UK, were considered. Finally, studies comparing the performances of different countries at the industry level and of the overall economy were addressed.

Chapter three explored the first hypothesis of this project which studied convergence between Greek and UK manufacturing industries in terms of output. Output was defined as gross domestic product (GDP). At first, total industry for both Greece and the UK was considered i.e. mining and quarrying, manufacturing, and electricity, gas and water. It was demonstrated that although in 1963 the share of UK industry in GDP was more than double that in Greece, since then they were getting nearer to the same share. The convergence hypothesis was supported in respect of shares of manufacturing in GDP in Greece and the UK during 1963-84. In both industries the manufacturing sector was predominant over the entire period examined.

Then chapter three focused on the performance of both Greek and UK manufacturing sectors. Between 1963 and 1974 there was a tendency for the distributions of Greek and UK manufacturing industries to become more similar but the extent of the similarity diminished slightly in 1978 and 1984.

Greek and UK industries did not experience similar patterns of growth in relation to output. Greek industry was increasing very fast over the first two sub-periods 1963-68 and 1968-74 and since then the growth of its output decelerated. In the UK since the first sub-period the growth of output was decelerating and finally during 1978-84 there has been a negative growth of output (although there has been an increase of output in the UK since 1981 still in 1984 the level of manufacturing production was below its 1978 level). The biggest increase of output occurred during 1968-74 in Greece and during 1963-68 in the UK.

Over the entire period examined output grew over fifteen times faster in Greece than in the UK. The differences between the two manufacturing industries in respect of output diminished across the examined period; there was evidence to support the first hypothesis of this thesis. Furthermore, the main contributor to growth of output in Greek industry was the growth of share of capital while in the UK was the growth of total factor productivity (see also chapter five).

In addition it was considered any possible link between the size of a sector as measured by its share in total manufacturing output and stability calculated by standard deviation, coefficient of variation, range, average deviation, and normalised standard error index. Furthermore, any association between growth of output and stability was explored. There was enough evidence to support that there was a link between the size of an industry and its stability in Greece while in the UK there was a tendency for the most stable industries to hold the largest shares in the total. There was found a positive association between growth of output and stability.

Chapter four tested the second hypothesis of this thesis that there was a convergence between Greek and UK manufacturing industries in terms of capital and labour inputs, capital intensity, capital and labour productivity, and labour costs. Capital was defined as gross fixed capital stock and labour as the annual average of number of persons employed in Greece and as the number of persons employed at mid-June each year in the UK. Labour costs were interpreted as wages and salaries per unit of labour.

There was a significant similarity of the percentage distribution of Greek and UK manufacturing sectors in terms of capital stock, while in association with labour input, the two industries were dissimilar in 1963 and 1968, but showed some similarity in 1974, 1978 and 1984. However, the patterns of growth of the two industries were generally dissimilar in association with capital and labour inputs. Greek and UK industries did not emulate similar patterns of capital and labour growth. Capital growth increased in Greece at a rate of over nine times that of the UK in the whole period examined. A fall in labour growth in the UK compares to a significant increase in Greece during the period of 1963-84. Regression analyses carried out showed that the differences between the Greek and UK industries in terms of factor inputs diminished across the period 1963-84. The convergence hypothesis was supported in terms of capital and labour.

Capital intensity in chapter four was defined as the ratio of capital stock to labour input. The rankings of both Greek and UK industries in terms of capital intensity were quite similar but not the patterns of growth. During 1963-84 Greek and UK industries did not follow similar patterns of growth in association with capital intensity. In Greece, over the entire period examined, capital intensity grew, due to faster rise of capital in relation to labour while in the UK it was the result of acceleration of capital but also fall of growth of labour input. It is interesting to note that in the last sub-period examined, 1978-84, capital intensity rose far faster in the UK than in Greece. But this rise in the UK was due to greater fall of growth of labour in comparison to capital stock (see table 7.1) while in Greece it was due to greater increase of capital in association to labour. Over the entire period examined, capital intensity accelerated over twice as fast in Greece than in the UK indicating a tendency of convergence between the two manufacturing sectors. The discrepancies between the two industries in respect of capital/labour ratios proved to have narrowed over the examined period; the convergence hypothesis was supported.

Chapter four also considered the patterns of development of capital and labour productivities of both manufacturing sectors. Capital productivity was defined as output per unit of capital and labour productivity as output per unit of labour. Capital productivity decreased in both countries during all sub-periods and the entire period examined, mainly as a result of the faster growth of capital stock in relation to output. However, it cannot be said that Greek and UK manufacturing industries experienced the same patterns of growth. Capital productivity decreased significantly in Greece between 1963 and 1968, improved during 1968-74, deteriorated within 1974-78 and ameliorated in the last sub-period. In the UK, after a moderate fall of growth of capital productivity between 1963 and 1968, it deteriorated during 1968-74, improved across the period 1974-78 and deteriorated in the last sub-period. The differences between the Greek and UK industries in terms of output/capital ratios narrowed over the period 1963-84 showing that there has been a convergence between the two industries in respect of capital productivity.

Considering the growth cycles of labour productivity of the two manufacturing sectors it was demonstrated that labour productivity accelerated faster in both countries between 1963 and 1973 than since. Greek and UK industries did not seem to have emulated the same patterns of growth. Across the first two sub-periods, labour productivity grew much faster in Greece than in the UK. However UK industry surpassed the Greek in the last two sub-periods. It is interesting to note that the decrease of growth of labour productivity in Greek industry during 1978-84 was due to deceleration of rise of output and labour (labour rose faster than output). Over the same period of time, labour productivity speeded up in the UK largely due to steeper fall of growth of labour in relation to output (see table 7.1).

Over the entire period examined, the growth of labour productivity was much higher in Greece than in the UK showing a tendency of convergence between the two manufacturing sectors. Furthermore, the differences between the two industries in terms of output/labour ratios proved to have diminished over the examined period; the convergence hypothesis was supported.

Furthermore, it was shown in chapter four that in both industries the growth in aggregate labour productivity was not due to restructuring of employment toward high productivity and away from low productivity industries, but due to labour productivity changes within individual industries.

The final factor that chapter four considered was the growth of labour costs. Wages and salaries increased by only 3.4 % in Greece compared to a figure of 73.3 % in the UK over the period 1963-84. The discrepancies between the two manufacturing industries in respect of labour costs did not diminish across the entire period examined; the convergence hypothesis was rejected.

In the same period of time, labour costs per unit of output decreased in Greece due to faster growth of output in association with labour costs while there has been an increase in the UK. Hence, there was no tendency towards convergence between the two manufacturing sectors in terms of growth of labour costs and unit labour costs.

Chapter five examined the third hypothesis of this study that there was a convergence between Greek and UK manufacturing industries in terms of growth of total factor productivity (TFP). The estimation of total factor productivity followed NEDO's and Todd's[4] models. In order to estimate the growth of total factor productivity it was necessary to calculate the rate of return on capital as well as the labour and capital shares at the base year 1974. It was found that the rate of return on capital in the whole

Greek manufacturing was over triple that in the UK and the majority of Greek and UK industries had higher labour shares on output than capital.

Total factor productivity increased much faster in Greece than in the UK over the first two sub-periods. Since then the growth of TFP decreased in Greece while it decelerated in the UK during 1974-78 and rose again in the last sub-period. Considering the entire period examined, 1963-84, total factor productivity accelerated much faster in the UK than in Greece and although there was a tendency of convergence between the two manufacturing sectors during the first two sub-periods, that was not the case for the period 1963-84. The differences between the two manufacturing industries in terms of total factor productivity did not diminish over time; the convergence hypothesis was rejected.

Chapter five showed that the main contributor to growth of output was mainly the growth of capital share in Greece and the growth of TFP in the UK, indicating that Greek and UK industries did not experience similar patterns of growth across the entire period examined. It was shown that the main contributor to growth of labour productivity was the growth of TFP in both manufacturing industries, during 1963-84.

Chapter six examined the final hypothesis of this thesis that there was a convergence between Greek and UK manufacturing industries in respect of trade performance.

At first an attempt was made to give the general picture of the trade performance of the two manufacturing sectors. Therefore, the imports, exports and trade balances of both Greek and UK manufacturing industries, at an aggregate level, were assessed. Furthermore, the manufactured exports and imports as a percentage share of gross domestic product (GDP) in Greece and the UK were appraised. That preliminary stage of the analysis had shown that, across the entire period examined, Greek and UK manufacturing industries did not pursue similar patterns of growth of trade since the balance of trade deteriorated in the UK while the growth of trade deficit decelerated in Greece since 1968. During 1963-84, the share of exports in the GDP increased by 117.7 % in Greece and by 36.7 % in the UK while the share of imports in the GDP rose by 10.3 % in Greece and by 105.8 % in the UK.

Chapter six then examined the aggregate import demand and export demand functions for both industries across the period 1963-84 that were estimated following Prodromidis and Anastassakou[5] model. The results showed that Greek and UK industries did not pursue similar growth cycles. Considering the import demand functions, the price elasticity was found inelastic and significant in Greece while inelastic and insignificant in the UK. Both oil crises influenced negatively imports in Greece though it was only the first oil crisis that had a negative impact on UK imports. Furthermore, manufactured imports were found elastic with respect to GNP in both countries. Exports were proven to be foreign income elastic in Greece and foreign income inelastic in the UK. Exports were price elastic in Greece and inelastic in the UK.

The structure and growth of imports of 20 Greek and UK manufacturing industries were then studied. It was demonstrated that the distributions of imports of the two sectors were quite similar being most similar in 1978. The growth cycle of imports was dissimilar between the two countries in the different sub-periods. Manufactured imports increased much faster in the UK than in Greece during 1963-84.

The distribution and growth of exports of 20 Greek and UK manufacturing industries was also examined. It was found that there has not been a great similarity between the structure of exports of the two manufacturing sectors. There was shown a positive and significant association between the percentage distributions of output and exports in both countries. Manufactured exports accelerated much faster over the first two sub-periods than since in both industries. Exports increased much faster in Greece than in the UK in all sub-periods. Over the entire period examined exports grew nearly four times faster in Greece than in the UK. There was found a tendency towards convergence between Greek and UK manufacturing industries in terms of export performance during 1963-84.

The export/import ratio was estimated for both manufacturing industries at an aggregate level. This ratio was by far greater in the UK than in Greece in 1963. The differences between the two manufacturing industries in respect of export/import ratios diminished over the examined period; the convergence hypothesis was supported.

The import penetration of manufactured goods in Greece and the UK was also studied. The import ratios were calculated as the percentage share of imports in domestic consumption which was estimated by adding imports to gross output and subtracting exports. It was found that import penetration was greater in Greece than in the UK during 1963-73. The gap narrowed between 1974 and 1978 and since 1979 import penetration in UK exceeded that of Greece. Across the entire period examined, 1963-84, import penetration decreased in Greece by 19.1 % and accelerated by 142.2 % in the UK; Greek and UK industries did not pursue similar patterns of growth of import penetration.

Export ratios for both manufacturing industries were estimated, being defined as exports divided by gross output. The export ratio of total UK manufacturing industry accelerated at a much faster rate than in Greece during 1963-84. But export performance should be considered alongside import penetration. It was found that import penetration decreased while export ratio increased in Greece across the entire period examined. Over the same period, import penetration grew much faster than export ratio in total UK manufacturing. Hence, Greek and UK manufacturing industries did not reflect similar growth cycles in terms of export ratio.

The final factor that chapter six examined was the trade balance ratios for both Greek and UK manufacturing industries. Trade balance ratios were defined as the difference between exports and imports, divided by their sum. It was demonstrated that UK manufacturing was far more competitive than the Greek between 1963 and 1982 but UK trade competitiveness deteriorated particularly during 1978-84. In 1984 Greek industry was more competitive than the UK. The discrepancies between the two manufacturing industries in respect of trade balance ratios were studied across the period 1963-84 and the findings supported the convergence hypothesis.

Over the entire period examined, exports increased twice as fast as imports in Greece while the reverse was true for the UK. Greek manufacturing industry improved its trade competitiveness (although in 1984 was still far from satisfactory) while the UK did not. The results found supported the convergence hypothesis between Greek and UK manufacturing industries in respect of trade performance during 1963-84.

Tables 7.1, 7.2 and 7.3 summarize the main findings of this thesis.

SUMMARY TABLE 7.1

GROWTH OF GREEK AND UK MANUFACTURING INDUSTRIES

Growth (%) in terms of:		PERIOD 1963-68	1968-74	1974-78	1978-84	1963-84
Output	GR	64	81	25	1	274
	UK	13	8	4	-7	18
Capital	GR	130	98	46	6	606
	UK	19	33	5	-0.6	66
Labour	GR	4	21	14	4	50
	UK	0.4	-12	-8	-24	-38
Cap.Intens.	GR	121	63	28	2	371
	UK	19	51	14	31	168
Cap.Produc.	GR	-29	-9	-14	-5	-47
	UK	-5	-19	-1	-6	-29
Lab.Produc.	GR	58	49	10	-3	150
	UK	13	22	13	22	90
Labour Costs	GR	-7.5	-17.6	19.2	13.8	3.4
	UK	13.8	27.2	6	13	73.3
TFP	GR	31	27	-1	-4	56
	UK	10	15	10	16	63
Imports	GR	121	-1	22	7	188
	UK	58	37	13	34	226
Exports	GR	42	136	32	29	467
	UK	21	58	16	-2	117

source: tables 3.5, 4.3, 4.9, 4.15, 4.19, 4.24, 4.30, 5.3, 6.5 and 6.9.

SUMMARY TABLE 7.2

REGRESSION ANALYSES BETWEEN TIME AND THE ABSOLUTE DIFFERENCES BETWEEN GREEK AND UK MANUFACTURING INDUSTRIES IN RESPECT OF OUTPUT, CAPITAL, LABOUR, CAPITAL INTENSITY, CAPITAL AND LABOUR PRODUCTIVITY, LABOUR COSTS, TOTAL FACTOR PRODUCTIVITY, EXPORTS/IMPORTS RATIOS, AND TRADE BALANCE RATIOS.

Regression analysis between time and:	Period 1963-1984	
Output	Y = 23616 - 1291 T	R2 = 0.49
	(-4.43)	d = 1.51
Capital	Y = 38497 - 3476 T	R2 = 0.10
	(-1.77)	d = 1.44
Labour	Y = 3469130 - 81384 T	R2 = 0.87
	(-11.6)	d = 1.48
Cap.Intens.	Y = 14.03 - 0.53 T	R2 = 0.19
	(-2.15)	d = 1.72
Cap.Produc.	Y = 0.31 - 0.01 T	R2 = 0.46
	(-4.13)	d = 1.44
Lab.Produc.	Y = 2254 - 31.6 T	R2 = 0.33
	(-2.10)	d = 1.45
Labour Costs	Y = 1523 + 29.9 T	R2 = 0.20
	(2.27)	d = 1.47
TFP	Y = 0.09 + 0.002T	R2 = 0.11
	(0.66)	d = 1.49
Exp/Imports	Y = 48.4 - 3.33 T	R2 = 0.75
	(-7.84)	d = 1.83
Trad.Bal.Rat.	Y = 0.38 - 0.03 T	R2 = 0.87
	(-11.5)	d = 1.62

where Y is the absolute difference between the Greek and UK distributions in terms of output, capital and labour inputs, capital intensity, capital and labour productivity, labour costs, total factor productivity, exports/imports ratios, and trade balance ratios; T is time, representing the period 1963-84; t-statistics are in brackets and t = 1.725 at 5 % level at t = 2.086 at 5 % level, two-tail test. Source: as tables 7.1.

SUMMARY TABLE 7.3

MAIN FINDINGS

During 1963-1984, the convergence hypothesis between Greek and UK manufacturing industries in respect of:

	First Hypothesis
Output	Has Been Supported
	Second Hypothesis
Capital	Has Been Supported
Labour	Has Been Supported
Capital Intensity	Has Been Supported
Capital Productivity	Has Been Supported
Labour Productivity	Has Been Supported
Labour Costs	Has Been Rejected
	Third Hypothesis
Total Factor Productivity	Has Been Rejected
	Fourth Hypothesis
Trade Performance	Has Been Supported

Taken overall there was a convergence between the patterns of growth of Greek and UK manufacturing industries during 1963-84. It was interesting to note that manufacturing performance improved in Greece during 1963-84 and was more competitive than the UK in terms of export/import ratio since 1983 and in relation to trade balance ratio in 1984.

Both countries have to ameliorate their manufacturing performance and trade competitiveness in order to eliminate their trade deficits.

The improvement of manufacturing performance in Greece and the UK raises a number of questions about the most appropriate policies for the future. To answer them would necessitate a separate thesis. This project provided a great deal of relevant information in connection with industrial developments in Greece and the UK so that other researchers will find it easier to understand the nature of the underlying problems as well as answer crucial policy questions.

B. LIMITATIONS

Labour costs, export and import demand functions were not examined for all twenty Greek and UK manufacturing industries because of limited availability of Greek statistical information. Index for labour adjusted for quality could not be considered for the same reasons as above. Furthermore, company concentration, size of plant and merger activity were not assessed due to lack of comparable statistical material concerning the Greek and UK manufacturing industries. The effect of the European Economic Community (EEC) on Greek and UK industries was not considered, because Greece was only an associate member until 1981, when it became a full member. However, even in 1981 Greece established transitional periods ending in 1987 under the Treaty of Accession for enactment of full EEC regulations. Therefore, to consider the EEC effects on the convergence hypotheses may be misleading.

C. FUTURE RESEARCH

It would be interesting to examine whether the convergence between Greek and UK manufacturing industries continued since 1984 in terms of growth of output, capital and labour inputs, capital intensity, capital and labour productivity, total factor productivity and trade performance. What were the contributors to growth of all the above factors from 1984 until today? Furthermore, the study of industrial policies that affected the growth of these factors from 1963 (that was the starting point of the statistical analysis of this thesis) until the present would be very beneficial so that lessons from possible mistakes of the past would be learned and better policies for the future are set.

Providing more statistical information is available for Greek manufacturing industry, it would be valuable to study and compare the Greek and UK industries, for the period 1963 until today, in terms of:

(a) the four hypotheses that this project considered in respect of annual percentage change;

(b) the index for labour adjusted for quality and education;

(c) concentration and merger activity; and

(d) labour costs at a disaggregate level.

The estimation of total factor productivity for the Greek manufacturing industry at an aggregate and disaggregate level according to different approaches that this thesis examined (such as Cobb- Douglas production function) would be very useful.

It would be interesting then to compare the results to equivalent estimates for the UK.

Noting the limitations imposed by the exemptions held by Greece suspending full enactment of EEC regulations in terms of trade, it would be useful to consider the consequences of EEC membership on the convergence hypotheses examined in this thesis and wider issues.

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APPENDIX ONE

PROBLEMS CONCERNING THE STATISTICAL ANALYSIS OF THIS THESIS.

The problems encountered while collecting the data and running the statistical analysis of this project will be discussed in this chapter. The purpose being to promote a greater understanding of why and how particular methods were employed and how particular problems of this study were overcome. In addition the problems themselves point to difficulties that future researchers may encounter so that steps are taken to avoid or to minimize such anomalies.

(i) Chapter three

The first chapter where detailed statistical examination was accomplished was chapter three. Here, the first hypothesis of this thesis is tested, that examines convergence between the Greek and UK manufacturing industries, during 1963-84, in terms of output.

The first problem confronted was how output was supposed to be defined and where the required information was to be found.

It was considered best to look first for the Greek data as statistical information for UK manufacturing is in abundance.

During the early stage of this study serious problems were encountered concerning statistical sources for Greece. It had been expected that all the statistical material required for Greece could be brought together in the United Kingdom.

A number of statistical sources were looked at in the UK concerning the Greek manufacturing industry but Greek data was limited in the following way:

(i) lack of disaggregated data according to the level that this thesis required;

(ii) inconsistent coverage as some data referred not to total industries but to those employing either over 10 or 20 people;

(iii) incomplete series.

No libraries contacted in the UK were able to supply the statistical material required for the Greek industry. The Greek Embassy in London was contacted who stated that continuous series of data on output per manufacturing sector (at the needed disaggregated level) during 1963-84 could only be collected from the National Accounts Offices in Athens who eventually supplied data on gross domestic product (GDP) by manufacturing industry.

Comparable figures for UK manufacturing were extracted from the "National Income and Expenditure", different editions. But there was not data on output per manufacturing industry at a disaggregated level for the years 1964-1967 and 1969. Different publications were also examined unsuccessfully. The Central Statistical Office of the UK was contacted but could not help. The lack of figures concerning the output (GDP) per UK industry at a disaggregated level for the years 1964-67 and 1969 is one of the reasons why the benchmark years were decided to be 1963, 1968, 1974, 1978 and 1984 in this study.

Because of lack of disaggregated figures on output for UK manufacturing industry for the years specified above, the annual rates of growth of output could be estimated only for the period 1970-84.

It should be added that the data on gross domestic product for both manufacturing industries was evaluated at factor cost. According to Silver[1] it is best to estimate output at factor cost (excluding taxes on expenditure and including subsidies) than at market prices (including taxes) because otherwise the evaluation of production would be reliant on fiscal policy.

- *Autocorrelation*

The absolute differences between the Greek and UK manufacturing industries in respect of output were regressed against time and in many cases the Durbin-Watson statistic was found very low, showing presence of autocorrelation.

Where autocorrelation was found was then corrected in a way that is well demonstrated by Salvatore[2]. Salvatore said that:

"One method to correct positive first-order autocorrelation (the usual type) involves first regressing Y on its value lagged one period, the explanatory variable of the model, and the explanatory variable lagged one period:

$Y_t = b_o\ (1-p) + p\ Y_{t-1} + b1\ X_t - b_1\ pX_{t-1} + v_t$ (a) (the preceding equation is derived by multiplying each term of the original OLS model lagged one period by p, subtracting the resulting expression from the original OLS model, transposing the term pY_{t-1} from the left to the right side of the equation, and defining $v_t = u_t - pu_{t-1}$.) The second step involves using the value of p found in equation (a) to transform all the variables of the original OLS model, as indicated in equation (b), and then estimating equation (b):

$$Y_t - \hat{p}\, Y_{t-1} = b_o\, (1-\hat{p}) + b_1\, (X_t - \hat{p}\, X_{t-1}) + v_t \quad (b)$$

The new error term, v_t, in equation (b) is now free of autocorrelation. This procedure is known as the Durbin two-stage method and is an example of generalized least squares."

(ii) Chapter four

This chapter studies the second hypothesis of this thesis which considers convergence between the Greek and UK industries in relation to capital and labour, capital intensity, capital and labour productivity, and labour costs.

a. Capital stock

The first problem that was faced concerning this chapter was the definition of capital stock as well as the collection of the data.

At that early stage of the research it was thought that the entire statistical material, required for Greece, could be collected in the UK. Different sources available in the UK that might have provided data for capital stock for Greek manufacturing industry were examined and no data could be found for disaggregated capital stock for the period 1963-84. The only information that was available related to investment.

Failure to find a source for data on capital stock for Greek manufacturing at a disaggregated level led to the conclusion that this was not available. The solution seemed to be the estimation of the data using information available on investment. Before explaining the approach used to estimate capital stock a few points about the perpetual inventory method will be discussed.

- *The perpetual inventory method*

Capital is usually measured by the "perpetual inventory method". This model was first applied to United Kingdom data by Redfern[3] in 1955 and subsequently by Dean[4] and Griffin[5].

The total value of capital stock, K_t, estimated by the perpetual inventory method is demonstrated by Silver[1] and is given by:

$$K_t = P_{t,1}K_{t,1} + P_{t,2}K_{t,2} + P_{t,3}K_{t,3} + \ldots P_{t,n}K_{t,n}$$

where $K_{t,i}$ (i = 1, 2, ...n) are capital goods of type i in the year t; P represents the price of each capital good.

The change in the value of capital stock in year t is calculated by:

$$\delta K_{t,i} = I_{t,i} - D_{t,i}$$

where It,i denotes gross investments over the period t for each type of capital good (i = 1, 2, ...n) and $D_{t,i}$ represents depreciation for each capital good.

The value of each capital good over the period t can be estimated as:

$$K_{t,i} = K_{o,i} + \Sigma_{j=0}^{t-1} \delta K_{j,i}$$

where the initial value of capital $K_{o,i}$ can be calculated in a straightforward manner by a variant of the perpetual inventory method itself.

The perpetual inventory method (as well as variances of it) is the method of estimating capital stock employed by national statistical agencies all over the world[6].

- *Estimation of Greek capital stock by the perpetual inventory method*

Capital stock was estimated following a variant of the perpetual inventory method shown above and was suggested by the Centre of Planning and Economic Research in Athens. The equation is as follows:

$$K_t = K_{t-1} - pK_{t-1} + I_t \qquad \ldots (1)$$

where K_t is the net fixed capital stock in the year t; p is the depreciation rate and equals 1/x where x represents the average service life that the assets are assumed to last and finally, I_t denotes the investments in that particular year t.

The starting point for estimation of capital stock could not be earlier than 1963 because there was no data prior to that year concerning the gross fixed capital formation of the Greek manufacturing industry according to the classification required.

At this point it should be mentioned that the data on gross fixed capital formation for the Greek manufacturing industry was taken from the Federation of Greek Industries[7]. These data sets represent manufacturing firms of Corporation and Limited Liability form covering approximately 85 per cent of the Greek manufacturing industries. The average service life of the fixed assets was assumed to be 25 years, therefore, the depreciation rate, p, would be 1/25 i.e. 0.04.

As an illustration of this model the net fixed capital stock (at current prices) of Greek food industry will be demonstrated for the period 1963-84, having as a starting point the year 1963.

The equation (1) for the year 1963 will be:

$$K_{1963} = K_{1963-1} - 0.04\, K_{1963-1} + I_{1963}$$

but as 1963 is considered to be the base year then, K_{1963-1} i.e. K_{1962} will equal zero. Therefore, $K_{1963} = I_{1963} = 330$. Then,

$$K_{1964} = K_{1963} - 0.04 * K_{1963} + I_{1964} \text{ i.e.}$$

$$K_{1964} = 330 - 0.04 * 330 + 173 = 489.8$$

$$K_{1965} = 489.8 - 0.04 * 489.4 + 221 = 691.2$$

$$K_{1966} = 691.2 - 0.04 * 691.2 + 240 = 903.5$$

$$K_{1967} = 903.5 - 0.04 * 903.5 + 264 = 1131.4$$

$$K_{1968} = 1131.4 - 0.04 * 1131.4 + 367 = 1453$$

$$K_{1969} = 1453 - 0.04 * 1453 + 856 = 2251$$

$$K_{1970} = 2251 - 0.04 * 2251 + 1305 = 3466$$

$$K_{1971} = 3466 - 0.04 * 3466 + 1027 = 4354$$

$$K_{1972} = 4354 - 0.04 * 4354 + 1860 = 6040$$

$$K_{1973} = 6040 - 0.04 * 6040 + 2228 = 8026$$

$$K_{1974} = 8026 - 0.04 * 8026 + 2803 = 10508$$

$$K_{1975} = 10508 - 0.04 * 10508 + 3761 = 13849$$

$$K_{1976} = 13849 - 0.04 * 13849 + 5471 = 18766$$

$$K_{1977} = 18766 - 0.04 * 18766 + 5488 = 23503$$

$$K_{1978} = 23503 - 0.04 * 23503 + 6629 = 29192$$

$$K_{1979} = 29192 - 0.04 * 29192 + 5260 = 33284$$

$$K_{1980} = 33284 - 0.04 * 33284 + 7145 = 39098$$

$$K_{1981} = 39098 - 0.04 * 39098 + 11037 = 48571$$

$$K_{1982} = 48571 - 0.04 * 48571 + 26760 = 73388$$

$$K_{1983} = 73388 - 0.04 * 73388 + 13010 = 83462$$

$$K_{1984} = 83462 - 0.04 * 83462 + 12999 = 93122$$

Table A.1

NET FIXED CAPITAL STOCK IN GREEK MANUFACTURING INDUSTRIES ESTIMATED ACCORDING TO EQUATION (1), 1974 PRICES.

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Food	594	866	1185	1497	1845	2374	3584	5292	6528	8774	9848	10508	12706
Beverages	178	343	614	1026	1421	1552	1484	2212	2697	3514	3850	4607	5153
Tobacco	146	216	300	439	620	802	924	1030	991	1009	967	916	1105
Textiles	840	1966	2714	3143	3566	4337	5247	6818	9484	13007	14709	17627	22267
Footw. Wear.	45	136	46	70	106	221	328	392	508	852	1015	1202	1505
Wood-Cork	36	223	300	453	520	645	782	951	1417	1885	2115	2477	2493
Furniture	31	28	84	103	109	160	307	316	441	477	582	593	589
Paper-Prod.	353	797	1139	1451	2059	2534	2742	2965	3390	4541	4269	4524	5697
Print. Publ.	11	291	360	375	462	484	607	682	936	1295	1329	1355	1413
Leather	52	92	127	138	144	136	140	157	190	229	233	216	225
Rub. Plastics	210	343	456	652	884	1384	1822	2200	2754	3444	3486	3353	3936
Chemicals	889	2592	8558	9861	8958	9090	8097	9318	10642	12771	12758	14109	15072
Petrol-Prod.	18	549	1813	1758	2088	1961	3057	2780	4544	7971	9785	11335	11324
Non Met. Min.	825	1579	2314	2978	3566	5382	5845	7286	10445	13347	14525	16023	18467
Basic Metals	701	3618	7323	8418	10060	11418	12403	15782	17646	18177	16866	14683	15313
Metal Prod.	360	668	1014	1628	2832	3173	3009	3768	3804	5006	5617	8356	9410
Machinery	59	103	118	366	454	511	543	776	975	1331	1366	1229	1397
Electrical	248	426	580	801	910	1229	1655	2266	2777	3655	3766	5433	6253
Transport Eq.	273	604	710	798	1034	1528	2158	2809	4265	5550	6498	7825	9312
Miscellaneous	14	42	60	65	70	74	143	157	223	331	302	375	470
Total	5883	15482	29815	36020	41708	48995	54877	67957	84657	107166	113886	126746	144107

Source: data on investments taken from "The State of Greek Industry", Federation of Greek industries, years 1963-84

Table A.1. continued

NET FIXED CAPITAL STOCK IN GREEK MANUFACTURING INDUSTRIES ESTIMATED ACCORDING TO EQUATION (1), 1974 PRICES.

	1976	1977	1978	1979	1980	1981	1982	1983	1984
Food	15245	17168	19645	18954	17910	18090	22984	21634	20082
Beverages	7275	6191	6769	7011	8762	9923	12685	11423	7997
Tobacco	1564	1558	1618	1546	1737	1683	2376	2129	1844
Textiles	28185	29889	30536	29274	26663	26281	29515	25127	21153
Footw. Wear.	2027	2535	2772	2790	2687	2912	3817	3440	3016
Wood-Cork	3081	3174	3030	3509	3623	3499	4183	3542	2960
Furniture	1092	1088	1110	957	813	826	1301	1117	952
Paper-Prod.	7339	7672	8605	8380	7658	6941	7675	6307	6919
Print. Publ.	1765	1823	1949	1937	1914	2031	2966	2747	2631
Leather	372	442	536	622	691	658	901	714	582
Rub. Plastics	5022	5596	6213	5828	5486	5493	7106	6666	6223
Chemicals	17503	17016	17074	15898	14948	15276	22204	21505	20495
Petrol-Prod.	8993	8041	8219	8905	8576	8679	9025	9844	10207
Non Met. Min.	23372	24028	25528	21200	25116	26740	34224	31988	28469
Basic Metals	16171	16538	16685	15369	15936	17914	24303	26192	25581
Metal Prod.	10474	10845	12795	13347	12842	16331	18627	16930	15580
Machinery	1894	2338	2439	2352	1948	1902	2622	2044	1706
Electrical	7613	7417	8137	7057	6485	5155	6720	5878	5095
Transport Eq.	10524	12622	15930	15070	16043	17178	22428	23452	23716
Miscellaneous	691	866	1085	983	960	990	1100	1091	999
Total	170202	176847	190675	180989	180798	188502	236762	223770	206207

Source: data on investments taken from "The State of Greek Industry", Federation of Greek industries, years 1963-84

In the same way the net fixed capital stock was estimated for all twenty Greek manufacturing industries. Then the data was deflated into 1974 constant prices using the capital deflator taken from the FGI[7]; the results can be seen in table A.1.

However, it was later discovered that data on capital stock for Greek manufacturing at a disaggregated level was available from the FGI.

For comparative reasons table A.2 shows the data sets on net fixed capital stock taken from the FGI that were then deflated into 1974 constant prices using the same deflator as above.

As the starting point for the estimation of capital stock by the perpetual inventory method was 1963, following equation (1), the capital stock of that year would equal investments. This explains the discrepancy of the figures of tables A.1 and A.2 during the first four years of the period examined. Between 1967 and 1974 this discrepancy tends to diminish only to widen again since 1975.

The estimates on Greek capital stock by the perpetual inventory method were not used because in order to get accurate figures since the beginning of the period examined (1963) data on capital formation at a disaggregated level for a period prior to 1963 was needed but not available.

Table A.2

NET FIXED CAPITAL STOCK IN GREEK MANUFACTURING INDUSTRIES, 1974 PRICES.

	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Food	3284	3355	3307	3222	3320	3637	4522	5947	6868	8805	9202	9402	11205
Beverages	790	878	1015	1295	1498	1619	1664	2266	2637	3326	3429	4117	4619
Tobacco	306	341	369	451	564	681	807	879	802	822	756	716	887
Textiles	2977	3839	4221	4434	4644	5271	5928	7431	9693	12681	13401	15625	19626
Footw. Wear.	93	157	100	119	145	247	331	386	463	758	871	1027	1238
Wood-Cork	115	293	343	454	489	562	645	751	1141	1521	1567	1890	1834
Furniture	59	57	101	114	116	161	295	301	411	447	537	537	532
Paper-Prod.	1158	1429	1616	1839	2391	2871	3051	3211	3537	4588	3942	3918	4875
Print. Publ.	88	346	403	413	488	503	597	621	829	1155	1158	1169	1221
Leather	102	129	153	146	148	160	156	170	195	219	215	187	186
Rub. Plastics	700	777	792	864	976	1368	1741	2026	2463	3000	2789	2489	2840
Chemicals	2971	4504	10175	11458	10894	10812	9655	10189	11400	12967	12097	12509	12368
Petrol-Prod.	74	599	1864	1871	2235	2173	3315	3114	4882	8300	9663	10586	9915
Non Met. Min.	1833	2368	2777	3229	3529	4431	4667	5678	8312	11064	11928	12985	14794
Basic Metals	2363	5095	8741	9856	11271	12333	12056	14177	15034	14948	12452	9316	8734
Metal Prod.	840	1064	1400	2055	2762	3052	2755	3322	3547	4641	4931	7369	8202
Machinery	119	147	177	372	401	417	447	644	825	1160	1185	1013	1157
Electrical	522	612	689	801	837	1077	1422	1904	2381	3065	3052	4629	5242
Transport Eq.	1673	1993	2026	2043	2235	2708	3322	3913	5274	6576	7319	8368	9636
Miscellaneous	45	67	84	80	77	79	140	148	210	302	258	320	395
Total	20112	28050	40353	45116	49020	54162	57516	67078	80904	100345	100752	108172	119506

Source: "The State of Greek Industry", Federation of Greek industries, years 1963-84

Table A.2. continued

NET FIXED CAPITAL STOCK IN GREEK MANUFACTURING INDUSTRIES, 1974 PRICES.

	1976	1977	1978	1979	1980	1981	1982	1983	1984
Food	12468	13833	15812	14863	13781	13735	16641	15781	14635
Beverages	6500	5251	5126	5418	7356	8251	9838	8655	5882
Tobacco	1129	1105	1140	1073	1282	1247	1565	1397	1176
Textiles	23721	24685	24502	23080	20878	20618	22409	19007	15656
Footw. Wear.	1652	2027	2192	2127	1999	2212	2781	2536	2197
Wood-Cork	2204	2246	2157	2600	2737	2671	2965	2386	1963
Furniture	900	843	834	686	595	605	921	793	685
Paper-Prod.	5981	6256	7165	7092	6532	5888	6344	5343	4903
Print. Publ.	1448	1442	1492	1425	1420	1515	2262	2096	2018
Leather	253	320	404	487	568	524	663	520	401
Rub. Plastics	3559	4018	4421	4001	3644	3635	4366	3947	3539
Chemicals	13094	12067	11717	10800	10324	10895	14874	14640	14093
Petrol-Prod.	7320	5905	5859	6300	6226	6460	6768	7589	7962
Non Met. Min.	17162	16870	17738	14368	17198	18972	24023	22301	19719
Basic Metals	9574	9276	9168	8219	8999	11067	15212	16075	15359
Metal Prod.	8824	8855	10404	10715	10115	13534	14575	12962	11847
Machinery	1513	1869	1896	1792	1471	1484	1993	1640	1333
Electrical	6119	5977	6512	5507	5025	3928	4670	4056	3433
Transport Eq.	10415	12405	15894	15046	15764	16622	21190	22243	22583
Miscellaneous	568	728	906	800	782	797	848	813	716
Total	134404	135978	145339	136399	136696	144660	174908	164780	150100

Source: "The State of Greek Industry", Federation of Greek industries, years 1963-84

- *Capital stock and UK manufacturing industry*

There has not been any problem obtaining data on capital stock for UK manufacturing industry. The problem that was faced though, was that the official publications did not publish all the data consistent with the classification used in this study. Hence, the Central Statistical Office was contacted and appropriate disaggregated figures on capital stock were sent for the years 1963-84.

- *Gross versus net capital stock*

Another factor that had to be considered was whether gross or net fixed capital stock should be used.

Gross capital stock has been used in preference to net capital stock. The main reason for this is because Greek and UK manufacturing industries do not use the same approach for depreciating their capital stock thus making comparison of their net fixed capital stock unreliable.

To be more precise, capital consumption in the UK manufacturing is calculated using the "straight line" method[7] under which the asset is assumed to depreciate by a constant amount each year.

In Greece, the capital stock as well as the depreciation are balance sheets data as there is hardly any other data published at a disaggregated level. Tsoris[8] adds:

> " ... the items of the balance sheets which refer to depreciation are more or less arbitrary and do not indicate the level of depreciation, due to the actual technological and economic obsolescence of the capital stock. The annual depreciation could range from zero to a hundred (!) per cent of the corresponding investment and this would depend on the amount of annual investment that a firm would undertake, on the specific branch of manufacture, on the destination of the products of a firm (i.e. the local market or export) and, finally, on the geographic region where the investment takes place."

b. Labour input

The data concerning the labour input for Greece represent the number of persons employed (annual average). The data sets for the years 1963-70, 1974-75 and 1980 were taken from the National Statistical Service of Greece extracted from the "Annual Industrial Survey", different editions. The figures for the years 1973 and 1978 were taken from the "Statistical Yearbook of Greece", edition 1985. The information for the years 1981 and 1984 was drawn from the "Census of Industry, Handicraft and Commerce", different editions.

The data sets for Greece for the rest of the years represented industries that employ over ten people, being available at the Greek National Statistical Service. Using this information and with the help from the National Statistical Service in Athens the data for the years 1971-72, 1976-77, 1979, and 1982-83 were approximated concerning the annual average labour force employed in the Greek manufacturing industry at an aggregate and disaggregate level. This is another reason why the benchmark years for this thesis were decided to be 1963, 1968, 1974, 1978 and 1984 since for these years all data were available.

There was not any problem collecting the statistical material for the UK. The data for labour input represents the number of persons employed at mid-June each year and was taken from the "Annual Abstract of Statistics", different editions. At some points where the data sets were not as disaggregated as required, they were estimated according to the advice given from the Department of Employment.

c. Labour cost

At first different sources within the UK were examined concerning the labour costs for the Greek manufacturing industry but not all the statistical information required was available. Eventually, the data sets for the Greek industry at a disaggregated level were found at the National Statistical Service of Greece in the "Annual Industrial Survey", different editions, for the years 1963-70, 1974-75, and 1980. From the same source, the figures for the years 1971-1973, 1976-77 represented manufacturing industries (at a disaggregate level) employing over 10 people and for the years 1978-79 and 1981 industries employing over 20 people. There was not any information for the years after 1981 for the Greek manufacturing industry at a disaggregate level.

Due to the problems mentioned above, it was realized that statistical analysis on labour cost for all twenty Greek manufacturing industries between 1963 and 1984 was impossible. Therefore, the numerical operation could be carried through based on data representing wages and salaries for the total Greek manufacturing. But still there were problems to be solved.

The information available for total manufacturing industries employing over 10 or 20 people was used and with the help given from the National Statistical Service in Athens and Federation of Greek Industries the data missing for the years 1971-73, 1976-1979 and 1981-84 were approximated.

The figures on wages and salaries for Greek industry were deflated into 1974 constant prices using as a deflator the "index of wages and salaries for manufacturing", taken from the FGI, at different years. Then these estimates were divided by the labour force employed in Greek manufacturing. The sources of data for the number of people employed have already been highlighted in section b.

There has not been any problem gathering the statistical information for labour remuneration for the UK. The data for the years 1964-67 and 1969 was taken from the "CSO Economic Trends", Annual Supplements, different editions and for the rest of the years from the "Business Monitor", different editions. The data represent figures for operatives, administrative, technical and clerical employees.

Then, the figures were modified into 1974 constant prices using as a deflator the "income from employment" taken from the "CSO, UK National Accounts", ed. 1985. These figures were then divided by the labour force employed in UK manufacturing industry.

The absolute differences between Greek and UK manufacturing industries in respect of capital and labour inputs, capital intensity, capital and labour productivity and labour costs were regressed against time. When autocorrelation was found was corrected in the same way as explained above.

(iii) Chapter five

This chapter studies the third hypothesis of convergence between the Greek and UK manufacturing industries in terms of total factor productivity.

Most of the problems concerning this chapter were related to the previous chapters and therefore have already been discussed. In the literature review chapter different ways of estimating productivity as well as total factor productivity have been pointed out.

This thesis estimates total factor productivity according to Todd's[9] and NEDO's[10] patterns that have already been highlighted in the literature review chapter. It has already been said that there was not any data concerning the UK manufacturing industry at a disaggregate level in respect of gross domestic product for the years 1964-67 and 1969. Therefore, the differences between the Greek and UK industries in terms of total factor productivity could only be studied across the period 1970-84. Here again, when autocorrelation was found was corrected in the same way as for output.

(v) Chapter six

The fourth hypothesis of this study is examined in this chapter that there was a convergence between the Greek and UK manufacturing industries in respect of trade performance across the period 1963-84.

The problems faced in this chapter involved mainly the collection of statistical material concerning trade figures. To be more precise, Greek official publications refer to imports and exports annalysed by commodity and not by industry that this thesis requires. Studies of others such as Tsoris[8] include data sets of imports and exports by industry that have been estimated by themselves by converting the data published on trade by commodity to industry. But their estimates could not be used because they related to a period of time outside the years covered in this thesis.

After contacting different libraries and statistical services in Greece and the UK, the data sets on trade for Greece were eventually supplied by the Centre of Planning and Economic Research in Athens.

Disaggregate data for imports and exports for the UK was extracted for the years 1970-84 from the Business Monitor M10 "Overseas trade annalysed in terms of industries" and for the years 1963 and 1968 from the "CSO Input-Output Tables for the UK".

The figures for the rest of the years were taken from the "Yearbook of International Trade Statistics", different editions.

Chapter six also examines the aggregate export and import demand functions of Greek and UK manufacturing industries, over the period 1963-84, following Prodromidis and Anastassakou[11] equations. Due to not available information concerning the duties in Greek manufacturing at a disaggregate level for continuous series of years, only aggregate import and export demand functions could be studied.

Export ratios (calculated as exports divided by output) and import ratios (estimated as the percentage share of imports in domestic consumption being calculated by adding imports to gross output and subtracting exports) define output as gross output in this chapter.

The two most popular measures of output for the estimation of export and import ratios are gross output[10] and value added[12]. Here output is defined as gross output because the statistical information on value added for the Greek manufacturing industry at a disaggregated level is more limited in relation to the information concerning gross output.

The data sets on gross output for Greece between 1963 and 1981 were extracted from the "Yearbook of Industrial Statistics", OECD, different editions. But the data on gross output for the Greek manufacturing industry for the years 1982-84 was not available and was estimated through the information given in the National Accounts of Greece and the "State of Greek Industry", Federation of Greek Industries[7]. The equivalent data for the UK was taken from the "Business Monitor, Census of Production, Summary Tables", "Annual Abstract of Statistics" and from the "Yearbook of Industrial Statistics", OECD, different editions.

The differences between Greek and UK manufacturing industries in respect of trade balance ratios (defined as the difference between exports and imports divided by their sum) were studied across the period 1963-84. When the regression analyses showed signs of autocorrelation were corrected in the same way as explained earlier on.

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APPENDIX TWO

Table 1

INVESTMENTS IN GREEK AND UK MANUF. INDUST., 1963-84, 1974 PRICES.

Year	Greece (million drs)	United Kingdom (million £)
1963	5883	2307
1964	9935	2661
1965	15384	2916
1966	8347	2963
1967	7693	2900
1968	8890	2966
1969	9040	3330
1970	17446	3641
1971	20591	3330
1972	28491	3003
1973	26913	3028
1974	37642	3062
1975	32477	2780
1976	47706	2763
1977	29923	2984
1978	34269	3160
1979	26086	3180
1980	41034	2657
1981	47387	1983
1982	84591	1954
1983	35657	2053
1984	27476	2380

source: GR__"The State of Greek Industry", FGI, different years.

UK__"National Income and Expenditure", different years.

Table 2

The percentage change of investments in Greek and UK manufacturing industries, 1963-84 (1974 constant prices).

Period	Greece	United Kingdom
1963-68	51.1	28.6
1968-74	323.4	3.2
1974-78	-8.9	3.2
1978-84	-19.8	-24.7
1963-84	367.0	3.2

source: Gr__"The State of Greek Industry", FGI, different years. UK__"National Income and Expenditure", different years.

APPENDIX THREE

NEDO's MODEL

This section will discuss the main points that NEDO's model examined.

NEDO compared the performance of UK and West German manufacturing industries during 1954-72. It involved a study carried out at an aggregate and disaggregate level. The industries studied were food; drink and tobacco; chemicals and allied industries; metal manufacturing; mechanical engineering; instrument engineering; electrical engineering; shipbuilding and marine engineering; vehicles and aircraft; metal goods; textiles; leather and fur; clothing and footwear; timber and furniture; bricks, pottery, glass and cement; paper, printing and publishing; and other manufacturing. The benchmark years were 1954, 1959, 1963, 1968 and 1972. The sub-periods studied were 1954-59, 1959-63, 1963-68, and 1968-72.

This comparative study was divided into five sections.

The *first section* considered the growth of output. At first the relative importance of industrial sectors in gross domestic product (GDP) was studied. Then the distribution of the above mentioned industries in the total manufacturing in the UK and West Germany was examined during the different benchmark years. The growth rates of output in manufacturing industries in both countries were considered over the different sub-periods and the entire period examined 1954-72. Then the structural changes in the two manufacturing industries were obtained, during the above mentioned sub-periods and the entire period examined, by calculating for each country the sum of the absolute differences between the percentage distributions of output in any two years. In order to facilitate comparisons between different periods, these sums of absolute differences were divided by the number of years in the period covered. Furthermore, the possibility that faster-growing industries tend to be more stable was studied. The size of a sector was measured by its share in manufacturing output. Measures of instability used were the standard deviation of annual rates of growth by industry, and the root mean square deviations from trends in industry output. The root mean square was calculated according to the formula:

$$RMS = \sqrt{[\Sigma (x_i - z_i)^2 / n]}$$

where x_i = the actual value in year i, expressed as a percentage of the trend value; z_i = the trend value in year i, expressed as a percentage of itself (i.e. 100 per cent); and n = the number of years.

Then, correlation coefficients between industry rates of growth and measures of stability in the UK and West Germany were considered over the period 1954-72.

The *second section* in NEDO's model concentrated on capital and labour inputs as well as their productivities. The percentage distribution of gross fixed capital stock in UK and West German manufacturing industries was examined during the above mentioned benchmark years. Then, correlation coefficients were studied relating UK and West German industry rankings in terms of capital stock share in different years. Growth of capital stock in UK and West German manufacturing industries at an aggregate and disaggregate level were estimated in different sub-periods. Correlation coefficients relating capital stock growth rate rankings in the UK and West Germany were then considered over different sub-periods. Sum of the absolute differences between the sectoral shares of gross capital stock in successive benchmark years in both countries were estimated in the same way as for output. Then, correlation coefficients relating output growth and capital stock growth in UK and West German manufacturing industries were examined in different sub-periods.

The same procedure as for capital stock was repeated for labour input.

Then, capital and labour inputs were considered in relation to one another. At first capital intensity "relatives" were estimated as capital per employee in an industry as a percentage of capital per employee in total manufacturing in the UK and West German in different benchmark years. Furthermore, the growth of capital/labour ratios in both manufacturing industries were calculated and correlation coefficients relating capital/labour growth rate rankings in both countries were considered.

Growth rates of capital productivity (defined as output per unit of capital stock) in UK and West German manufacturing industries were considered as well as correlation coefficients relating capital productivity growth rate rankings in both countries over different sub-periods. Then correlation coefficients relating capital productivity growth and output growth in UK and West German manufacturing industries were studied. The same procedure was repeated in respect of labour productivity (defined as output per unit of labour).

Furthermore, it was considered whether total growth in labour productivity in the UK and West German manufacturing industries was attributable to inter-sectoral labour reallocation (i.e. restructuring of employment toward high productivity and away from low productivity sectors) or attributable to sectoral labour productivity growth. The approach followed is as follows:

$$\frac{\Sigma P_n E_n}{\Sigma P_n E_o} * \frac{\Sigma E_o}{\Sigma E_n} * \frac{\Sigma E_o P_n}{\Sigma E_o P_o}$$

where Σ is the sum; E employment; P labour productivity; and 0 and n for subscripts denote base and terminal years.

The first two components combined measure output per head increases due to inter-industry shifts in employment, and the last one those due to increases in output per head within each industry.

Correlation coefficients relating output growth and labour productivity as well as labour productivity and capital productivity growth were examined in both manufacturing industries. Then, correlation coefficients relating labour productivity growth to, respectively, labour input growth and capital input growth in UK and West German manufacturing industries were studied.

Correlation coefficients relating labour productivity growth and the growth of prices (implied or wholesale prices) as well as price growth and output growth in UK and West German manufacturing industries were studied over different sub-periods.

The *third section* in NEDO's model examined the total factor productivity.

The achieved total factor productivity equation looks as follows:

$$P = Y / (\alpha L + \beta K) \qquad (1)$$

where L is an index of labour; K is an index of capital stock; "index" should be taken to mean an annual growth rate index; α and β are their respective weights, summing to unity.

The following equations were used in order to estimate the labour, α, and capital, β, shares of output in base year 0 :

$$\frac{w_o L_o}{w_o L_o + r_o K_o} = \alpha \qquad (2)$$

$$\frac{r_o K_o}{w_o L_o + r_o K_o} = \beta \qquad (3)$$

where L is labour; K is capital stock; w is average wages; and benchmark yars. Therefore, the adjusted labour index, L_a, and adjusted capital stock index, Ka, were estimated acording to the following formulas:

$$L_a = Y / (Y/L)p \quad \text{and} \quad K_a = K\,U$$

where Y is output; L labour; K capital stock; p denotes potential (i.e. peak trend); and U capital utilisation that is the result of dividing actual capital productivity by potential capital productivity.

Then, the resource utilisation deflator, D, was estimated as follows:

$$D = (\alpha L_a + \beta K_a) / (\alpha L + \beta K)$$

The resource utilisation deflator, D, was then used to convert an index of achieved total factor productivity, P, to one of underlying total factor productivity, T, according to:

$$T = P / D$$

The estimation of growth of achieved and underlying total factor productivity followed, at an aggregate and disaggregate level for both UK and West German during different sub-periods and the entire period examined. Furthermore, correlation coefficients relating underlying productivity growth rate rankings in the UK and West Germany were undertaken across different sub-periods.

Then, equation (1) was transformed in the form that is seen below:

$$\dot{Y} = \alpha \dot{L} + \beta \dot{K} + \dot{P} + \dot{P} \alpha \dot{L} + \dot{P} \beta \dot{K} \qquad (4)$$

where $\dot{Y}$, $\dot{L}$, $\dot{K}$, and $\dot{P}$ represent an annual growth rate and α and β as defined in equations 2 and 3.

Equation (4) was then used in order to estimate the contributions of various factors to the rate of output growth of different industries in the UK and West Germany during 1954-72.

Correlation coefficients relating the growth of achieved total factor productivity and the growth of labour and capital productivity as well as output in UK and West German manufacturing industry were carried out over different periods. Finally, correlation coefficients between achieved and underlying productivity growth and price changes in 13 UK and West German manufacturing sectors were studied during different sub-periods.

The *fourth section* in NEDO's model examined company concentration and merger activity.

At first aggregate concentration in UK manufacturing was considered in terms of quoted companies with net assets of £500.000 and over as well as losses of companies from the ranks of the largest 200 quoted companies during 1948-72.

Comparisons of aggregate concentration and company size in the UK and West Germany were then carried out. UK and West German companies in the 500 largest European companies in petroleum, mining and manufacturing in 1972 and 1973, ranked by turnover were examined. Furthermore, UK and West German manufacturing companies in the 200 largest non-US petroleum, mining and manufacturing companies in 1963 and 1973, ranked by sales were studied.

Then, three-company concentration ratios in terms of net assets of £500.000 and over were examined at a disaggregate level in UK manufacturing industry for the period 1954-68. Total expenditure on acquiring controlling interests in subsidiary companies by UK public quoted companies in the manufacturing sector, and gross domestic fixed capital formation by the manufacturing sector were studied over the period 1954-72. It was also considered the numbers of quoted companies acquired or amalgamated in UK manufacturing industry and the percentage of total industry net assets involved during 1954-72.

Indices of numbers of enterprises acquired or amalgamated (mainly mining and manufacturing industries) in the UK, West Germany, France, Sweden, the Netherlands and the US were studied over the period 1954-72. UK manufacturing industries were ranked according to net assets of all companies acquired or amalgamated with net assets of £500.000 or over, as a percentage of total net assets of all such companies within each industry, in the period 1955-68. Then, the number of plants employing over 1000 people were studied in the UK and West German manufacturing industries over the period 1958-68.

The *fifth and final section* in NEDO's model examined the UK and West German trade in manufactures.

At first the proportion of output exported by manufacturing industries in UK and West Germany was examined during 1954-72.

Over the same period of time, import ratios were estimated by manufacturing industries in UK and West Germany being defined as the share of imports in domestic consumption being calculated by adding imports to gross output and subtracting exports. Trade balance ratios were calculated, for a series of industries in UK and West Germany and over the same period of time as above, being defined as the difference between exports and imports divided by their sum. Then, correlation coefficients between trade balance ratios and import and export ratios in the UK and West Germany were undertaken.

Furthermore, the percentage distribution of manufactured imports and exports by industry in the UK and West Germany were studied over different sub-periods and the entire period examined.

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APPENDIX FOUR
STATISTICAL APPENDIX FOR CHAPTER THREE

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:growth
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 GC63 GC64 GC65 GC66 GC67 GC68 GC69 GC70 GC71 GC72 GC73 $
GC74 GC75 GC76 GC77 GC78 $
GC79 GC80 GC81 GC82 GC83 GC84

set GPGR68 1963,1 1963,21 = (GC68(t)/GC63(t))-1
set GPGR74 1963,1 1963,21 = (GC74(t)/GC68(t))-1
set GPGR78 1963,1 1963,21 = (GC78(t)/GC74(t))-1
set GPGR84 1963,1 1963,21 = (GC84(t)/GC78(t))-1
set GPGR894 1963,1 1963,21 = (GC84(t)/GC63(t))-1
print 1963,1 1963,21 GPGR68 GPGR74 GPGR78 GPGR84 GPGR894
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ENTRY	GPGR68 23	GPGR74 24	GPGR78 25	GPGR84 26
1	.458092	.489275	.445380	-.588960E-01
2	1.02123	.823804	.560781	.105144
3	.116745	-.118268	.345509	-.181575
4	.702929	.892785	.333196	-.958177E-01
5	.442663	.478781	.329347	-.148205E-01
6	.541919	.783632	.285984	-.159824
7	1.23349	.300422	.277304	-.534011
8	.817844	.673483	-.427699E-01	.289362
9	.460369	.713755	.354447	.555734
10	.548697	.389725	-.181644	-.211838
11	.991883	1.56479	.328885	-.215208E-01
12	1.03610	1.20910	.191428	.866912E-01
13	.529637	.797500	-.504172E-01	.218967
14	.799915	.671012	.432340	.656566E-01
15	2.96735	1.96059	-.181393E-01	.294249
16	.496941	.872682	.113144	.228925
17	.644302	.803756	.121724	-.430538
18	1.04743	.799228	-.118026E-01	-.725299E-01
19	.155239	2.12251	.147658	.113290
20	.993127	1.18793	.511426	-.128259
21	.641944	.807829	.253849	.621770E-02

ENTRY	GPGR894 27
1	1.95379
2	5.35849
3	.843160E-01
4	2.88551
5	1.79397
6	1.97148
7	.728774
8	2.75465
9	4.27362
10	.388203
11	5.64286
12	4.82357
13	2.18260
14	3.59087
15	13.9261
16	2.83482
17	.894569
18	2.37628
19	3.60889
20	4.74570
21	2.74501

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NORMAL COMPLETION OF JOB
          HALT AT      0
              0 ERRORS          0 WARNINGS
```

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RATS86 version 2.02. 08/11/86
  Copyright (C) 1986.1985.1984 by VAR Econometrics
open data b:constant
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 GC63 GC68 GC70 GC71 GC72 GC73 $
GC74 GC75 GC76 GC77 GC78 $
GC79 GC80 GC81 GC82 GC83 GC84

set GPGR68 1963,1 1963,21 = (GC68(t)/GC63(t))-1
set GPGR74 1963,1 1963,21 = (GC74(t)/GC68(t))-1
set GPGR78 1963,1 1963,21 = (GC78(t)/GC74(t))-1
set GPGR84 1963,1 1963,21 = (GC84(t)/GC78(t))-1
set GPGR894 1963,1 1963,21 = (GC84(t)/GC63(t))-1
print 1963,1 1963,21 GPGR68 GPGR74 GPGR78 GPGR84 GPGR894
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ENTRY	GPGR68 18	GPGR74 19	GPGR78 20	GPGR84 21
1	.163445	.284743	.987654E-01	.128946
2	.190045	-.114068E-01	.169231	-.148026
3	-.468085E-01	-.212054	.104816	-.107692
4	.839525E-01	-.959561E-01	-.121304	-.434858
5	.121951E-01	.843373E-01	-.263889E-01	-.627675E-01
6	4.35385	.353448	-.912951E-01	-.212617
7	-.452790	.164706	.107744	-.179331
8	.265766	.139976	-.707596E-01	-.201568E-01
9	.237467	-.511727E-01	.167416	.211742
10	.326087E-01	.421053E-01	-.121212	.103448
11	.415493	.155887	.746055E-01	.774366E-01
12	.807412E-01	.109002	.150193	.124820
13	.476190	.152074	.416000	1.14124
14	.500695E-01	.109934	.119332	-.565032
15	-.617940E-01	.235836	-.239542	-.434815
16	.132562	.989788E-01	.393138E-01	-.202201
17	.307997	-.726392E-01	.144582	-.171086E-01
18	.153080	.111711	.480583E-01	.597499E-01
19	.359207E-01	.117577	.110556E-01	-.209171
20	.235602	.720339E-01	.276680E-01	.115385E-01
21	.132297	.752356E-01	.412098E-01	-.681082E-01

ENTRY	GPGR894 22
1	.854130
2	.171946
3	-.259574
4	-.513373
5	.152439E-02
6	4.18462
7	-.420601
8	.313814
9	.660950
10	.434783E-01
11	.894366
12	.550629
13	4.15646
14	-.432545
15	-.501661
16	.320285E-01
17	.364608
18	.423771
19	-.743187E-01
20	.376963
21	.181321

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NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS
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data 1963,1 1963,21 GRR68 GRR74 GRR78 GRR84 GRR894 UKR68 UKR74 UKR78 $
UKR84 UKR894

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FROM  1963:  1  UNTIL  1983:  1
VAR     1      GRR68
VAR     6      UKR68

CORRELATION MATRIX
    VARIABLE              GRR68          UKR68
          SERIES LAG       1   0          6   0
    GRR68        1   0    1.0000       -.14333
    UKR68        6   0   -.14333        1.0000


cmoment(print,corr) 63,1 63,21
# GRR74 UKR74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     2      GRR74
VAR     7      UKR74

CORRELATION MATRIX
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          SERIES LAG       2   0          7   0
    GRR74        2   0    1.0000         .33018
    UKR74        7   0    .33018        1.0000


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# GRR78 UKR78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     3      GRR78
VAR     8      UKR78

CORRELATION MATRIX
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    GRR78        3   0    1.0000         .20258
    UKR78        8   0    .20258        1.0000


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VAR     9      UKR84

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    UKR84        9   0    .17347        1.0000
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     GRR894       5    0    1.0000          -.16179
     UKR894      10    0   -.16179           1.0000


end


          NORMAL COMPLETION OF JOB
                    HALT AT     0
                          0 ERRORS          0 WARNINGS
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GR74 GR75 GR76 GR77 GR78 GR79 GR80 GR81 GR82 GR83 GR84


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set GP73 1963,1 1963,21 = (GR73(t)-GR72(t))/GR72(t)
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set GP80 1963,1 1963,21 = (GR80(t)-GR79(t))/GR79(t)
set GP81 1963,1 1963,21 = (GR81(t)-GR80(t))/GR80(t)
set GP82 1963,1 1963,21 = (GR82(t)-GR81(t))/GR81(t)
set GP83 1963,1 1963,21 = (GR83(t)-GR82(t))/GR82(t)
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print 1963,1 1963,21 GP4 GP5 GP6 GP7 GP8 GP9 GP70 GP71 GP72 GP73 GP74 GP75 $
GP76 GP77 GP78 GP79 GP80 GP81 GP82 GP83 GP84
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1	.233702E-01	.861951E-01	.119191	.290960E-01
2	.436321	.853859E-01	.164145	-.207927E-01
3	.170991	.795569E-01	.373134E-01	-.150180
4	.127995	.166414	.433651E-03	.105187
5	.175170	-.169527E-01	.691903E-01	.210464
6	.156439	.130045	.687831E-01	.113861
7	.201651	.128557	.565217E-01	.340741
8	.179678	.871849E-01	.125604	.523605E-01
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10	-.399177	.410959E-01	.129386	.801942
11	-.277597	-.310112	.107492	2.22647
12	.337193	.531330	.163007E-01	-.116530
13	-.179732	-.874126E-01	.229885	.436137
14	.200512	.201848	.342992E-01	.414523E-01
15	.910653E-01	-.283465E-01	1.19125	.301036
16	.176471	.592000E-01	.118958	-.674992E-03
17	.181044	.586114E-01	.834753E-01	.872642E-01
18	.280632	.598765E-01	.166570	.183724
19	.789907E-01	.559227E-01	.418873E-01	-.993530E-01
20	1.05155	.418760E-01	.136656	-.432815
21	.126931	.102161	.897340E-01	.871963E-01

ENTRY	GP8 27	GP9 28	GP70 29	GP71 30
1	.138897	.897807E-01	.116775	.715912E-01
2	.137359	.653442E-01	.309967	.105769
3	.211640E-02	-.427666E-01	-.501931E-01	.319396E-01
4	.170611	.976100E-01	.768213E-01	.184163
5	-.350991E-01	.493432E-01	.132884	.964726E-01
6	-.888889E-02	.526906E-01	.327476	.125953
7	.162676	.247624	-.850614E-01	.116096
8	.196574	.927062E-01	-.185278	.176110E-01
9	.163495	.126394	.421782	.742804E-02
10	.214595	.499734E-01	-.504967E-01	.148213

13	[illegible]	[illegible]	[illegible]	[illegible]
14	.158111	.118749	.207415	[illegible]
15	.312678	.608922	.493943	-.146847
16	.742992E-01	.165042	.147598	.834705E-01
17	.116414	.156736	.503919E-01	.117271
18	.923661E-01	.161776	.155866	.274871
19	.805541E-01	.220798	.539868	.259409
20	.446384	.517241E-02	.444254	.131829
21	.115803	.145907	.155479	.108001

ENTRY	GP72 31	GP73 32	GP74 33	GP75 34
1	.582147E-01	.809466E-01	-.169642E-02	.912769E-01
2	.157656	.920967E-01	-.651914E-01	.103647
3	-.438942E-01	-.523838E-01	.372671E-01	.162275
4	.140520	.202197	-.136763E-01	.106915
5	.107752	.756940E-01	-.479237E-01	.921307E-01
6	.904881E-01	.282261	-.189299	.281270
7	.978036E-01	.132503	-.179000	.974421E-02
8	.160271	.297665	.226887	-.129124
9	.843318E-01	-.225244E-01	.217391E-02	.189588
10	.103265	.157605	-.671819E-01	.573614E-02
11	.158347	.156835	-.390840E-01	.176041
12	.150997	.450907E-01	.322026E-01	.132516
13	-.410635	1.90476	-.172850	.754520E-01
14	-.168383E-01	.120053	.466152E-01	.350355E-01
15	-.304118E-01	.597473	-.679029E-01	-.662668E-01
16	.192057	.216093	-.108234	-.142857
17	.973282E-01	.128696	.728043E-01	.761221E-01
18	.127199	.926371E-01	-.146676	-.183047
19	.204573E-01	.152319	.121610	.136861E-02
20	.123820	.681606E-01	.109266	.206462
21	.788722E-01	.175508	-.283496E-01	.546796E-01

ENTRY	GP76 35	GP77 36	GP78 37	GP79 38
1	.857185E-01	.614670E-01	.149273	.817378E-02
2	.817391E-01	.205252	.847043E-01	.487805E-01
3	.250386	-.523280E-01	-.230435E-01	.191366E-01
4	.243923	-.438378E-01	.126384E-01	.624032E-01
5	.105944	.341316E-01	.642779E-01	.667352E-01
6	-.448859E-01	.318439E-01	.184171E-01	.238270
7	.125854	.714286E-03	.122769	-.122695
8	-.500468E-01	-.152634E-01	.175000	.194468
9	-.175055E-01	.601336E-01	.931373E-01	.105381
10	-.297845E-01	-.907903E-01	-.775862E-01	-.155763E-02
11	.259389E-01	.674216E-01	.318283E-01	-.231946E-01
12	.668628E-02	-.612380E-01	.113202	-.341935E-01
13	-.124151	-.454042E-01	.560712E-01	.343830
14	.105934	.151673	.865074E-01	.105565
15	.798997E-01	-.185405	.195370	.606377E-01
16	.173521	.712617E-01	.330270E-01	.589655E-01
17	.513847E-01	-.158680E-02	-.699301E-02	-.707426E-01
18	.210402	-.282118E-01	.283609E-01	.251900E-01
19	.265756E-01	.100296	.146545E-01	.139658
20	.198563	.626703E-01	-.164103E-01	-.141293
21	.998734E-01	.142730E-01	.656810E-01	.552132E-01

ENTRY	GP80 39	GP81 40	GP82 41	GP83 42
1	-.311528E-01	.134694E-01	-.225653E-01	-.154487E-01
2	.918507E-01	.223734E-01	.119048E-01	-.501730E-01
3	-.114847	-.922546E-01	.978261E-01	.990099E-03
4	-.613206E-01	-.199707E-01	-.109134	-.236873E-01
5	-.597494E-01	-.842159E-01	.108562	-.344944E-01
6	.217091E-01	-.175971	-.670417E-01	.276382E-02
7	-.206522	.118721E-01	-.636282E-01	-.172530
8	.174564E-01	.913866E-01	-.956047E-01	-.297978E-01
9	.121124	.405790E-01	.842027E-01	.134937

13	.275204E-01	.970565E-01	-.184917	.112575E-01
14	.825869E-01	.118319E-01	-.620656E-01	-.551874E-01
15	.689704E-01	-.143495	-.201596	.378555
16	.494161E-01	.625594E-01	-.620690E-01	-.394880E-01
17	-.195660	.599572E-01	-.107475	-.144409
18	.984961E-01	.111840E-01	-.102403	.284682E-01
19	.874317E-01	.573078E-01	.424714E-02	-.996878E-01
20	-.522162E-01	-.909673E-01	.620155E-01	-.471135E-01
21	.142153E-02	-.119004E-01	-.421083E-01	-.125731E-01

ENTRY	GP84 43
1	-.121063E-01
2	-.178506E-01
3	-.905045E-01
4	.636747E-01
5	.209132E-02
6	-.138562
7	-.146185
8	.107861
9	-.195801E-01
10	.214886
11	.179104E-01
12	.652960E-01
13	-.237537E-01
14	-.701301E-02
15	.210900
16	.155231
17	-.587302E-01
18	-.117744
19	-.602841E-01
20	.164345
21	.188559E-01

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
open data b:constant
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 GC63 GC68 GC70 GC71 GC72 GC73 GC74 GC75 GC76 GC77 GC78 $
GC79 GC80 GC81 GC82 GC83 GC84
set GGR71 1963,1 1963,21 = (GC71(t)-GC70(t))/GC70(t)
set GGR72 1963,1 1963,21 = (GC72(t)-GC71(t))/GC71(t)
set GGR73 1963,1 1963,21 = (GC73(t)-GC72(t))/GC72(t)
set GGR74 1963,1 1963,21 = (GC74(t)-GC73(t))/GC73(t)
set GGR75 1963,1 1963,21 = (GC75(t)-GC74(t))/GC74(t)
set GGR76 1963,1 1963,21 = (GC76(t)-GC75(t))/GC75(t)
set GGR77 1963,1 1963,21 = (GC77(t)-GC76(t))/GC76(t)
set GGR78 1963,1 1963,21 = (GC78(t)-GC77(t))/GC77(t)
set GGR79 1963,1 1963,21 = (GC79(t)-GC78(t))/GC78(t)
set GGR80 1963,1 1963,21 = (GC80(t)-GC79(t))/GC79(t)
set GGR81 1963,1 1963,21 = (GC81(t)-GC80(t))/GC80(t)
set GGR82 1963,1 1963,21 = (GC82(t)-GC81(t))/GC81(t)
set GGR83 1963,1 1963,21 = (GC83(t)-GC82(t))/GC82(t)
set GGR84 1963,1 1963,21 = (GC84(t)-GC83(t))/GC83(t)
print 1963,1 1963,21 GGR71 GGR72 GGR73 GGR74 GGR75 GGR76 GGR77 GGR78 GGR79 $
GGR80 GGR81 GGR82 GGR83 GGR84
```

ENTRY	GGR71 18	GGR72 19	GGR73 20	GGR74 21
1	.660112E-01	.718050E-01	.891211E-01	-.400677E-01
2	.789022E-01	-.461049E-01	.116667E-01	-.143328
3	-.222222E-01	-.681818E-02	-.915332E-02	-.184758
4	-.400844E-01	-.571429E-01	.204351	-.149032
5	.583090E-02	-.231884E-01	.108309	-.361446E-01
6	.559796E-01	.481928E-01	.140230	-.504032E-01
7	.843882E-01	.972763E-01	.638298E-01	-.100000E-01
8	-.166113E-01	.213964E-01	.209482E-01	.377970E-01
9	.610766E-01	.243902E-01	-.333333E-01	-.123153
10	-.309278E-01	-.106383	.226190	-.388350E-01
11	.605144E-02	-.150376E-02	.602410E-01	-.994318E-01
12	.143843E-01	.737379E-02	.872748E-01	-.621440E-01
13	-.414747E-01	.817308E-01	.977778E-01	.121457E-01
14	.579151E-01	.620438E-01	.100802	-.127992
15	-.127879	-.257123E-01	.984308E-01	.133117
16	.575126E-02	-.278771E-01	.294118E-01	-.714286E-01
17	.408401E-02	-.993608E-01	.580645E-02	-.173188E-01
18	.220966E-01	.854701E-02	.573280E-01	-.287600E-01
19	-.549882E-02	.568720E-01	.112481	-.581122E-01
20	.000000	.454545E-01	.474308E-01	-.452830E-01
21	.298754E-02	-.476583E-02	.688369E-01	-.413992E-01

ENTRY	GGR75 22	GGR76 23	GGR77 24	GGR78 25
1	-.740741E-01	.971429E-01	.769676E-01	.429876E-02
2	-.211538E-01	.903733E-01	-.288288E-01	.128015
3	-.849858E-02	.285714E-01	.138889E-01	.684932E-01
4	-.108415	-.850340E-02	.137221E-01	-.194585E-01
5	-.402778E-01	-.564399E-01	.337423E-01	.400593E-01
6	-.658174E-01	-.568182E-01	.530120E-01	-.205950E-01
7	.774411E-01	-.168750	.751880E-01	.150350
8	-.150884	.441176E-01	.551643E-01	-.667408E-02
9	-.179775E-01	.343249E-01	.807522E-01	.634596E-01
10	-.808081E-01	-.659341E-01	.705882E-01	-.439560E-01
11	-.459110E-01	.721805E-01	.434783E-01	.672043E-02
12	-.436223E-01	.825635E-01	.129067	-.160605E-01
13	.768000	-.339367	.558219	-.221978
14	-.167064E-01	.473301E-01	.521437E-01	.330396E-01
15	-.183954	-.280899E-01	.578035E-02	-.466954E-01
16	-.350250E-01	.740741E-03	.688379E-01	.692521E-02
17	-.326371E-03	.261182E-02	.918268E-01	.459290E-01
18	-.548544E-01	.220853E-01	.246231E-01	.588524E-01
19	-.129458	.684146E-01	.874233E-01	-.352609E-03

ENTRY	GGR79 26	GGR80 27	GGR81 28	GGR82 29
1	-.700910E-01	.106444	.171607E-01	.429448E-01
2	-.100329	.859232E-01	-.521886E-01	.195382E-01
3	-.148718	.111446	-.162602E-01	.909091E-01
4	-.819672E-01	-.329887	-.117812	-.254372E-01
5	.228245E-01	.153417E-01	-.122253	-.641628E-01
6	-.724299E-01	-.277078E-01	-.111399	.874636E-02
7	-.699088E-01	.130719E-01	-.774194E-01	-.279720E-01
8	-.537514E-01	.189349E-01	-.859466E-01	-.101652E-01
9	-.298364E-01	.127976	-.791557E-02	.274823E-01
10	-.459770E-01	.253012	-.125000	-.659341E-01
11	-.213618E-01	.189632	-.146789	-.403226E-02
12	-.102256	.673797E-01	-.796593E-01	.337507E-01
13	.567797	.484685	-.123786	.387812E-01
14	-.501066E-01	-.551066	-.150000	.852941E-01
15	-.813866E-01	-.323216	-.921212E-01	-.129506
16	-.488308E-01	-.224150E-01	-.156805	.421053E-01
17	-.650128E-01	.152790	-.112434	.196721E-01
18	-.662344E-01	.778770E-01	-.616659E-01	.372732E-01
19	.183422E-01	-.170766	-.321637E-01	-.181269E-01
20	-.142308	-.242152	.355030E-01	-.457143E-01
21	-.464414E-01	-.828317E-02	-.779096E-01	.119784E-01

ENTRY	GGR83 30	GGR84 31
1	.735294E-02	.267640E-01
2	-.383275E-01	-.615942E-01
3	-.631313E-01	-.619946E-01
4	.815661E-02	.598706E-01
5	.133779E-01	.841584E-01
6	.606936E-01	-.817439E-01
7	.575540E-01	-.816327E-01
8	.256739E-01	.951189E-01
9	-.776531E-02	.947826E-01
10	.470588E-01	.786517E-01
11	.391363E-01	.480519E-01
12	.101632	.119981
13	-.400000E-02	.147256E-01
14	.894309E-01	.149254E-01
15	.205521	-.458015E-01
16	-.488215E-01	.265487E-01
17	-.505700E-01	.612685E-01
18	.193853E-01	.612245E-01
19	.114286E-01	-.256410E-01
20	-.479042E-01	.654088
21	.120812E-01	.434467E-01

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
RATSSM Version 2.02. 08/11/86
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open data b:babas
cal 1964 1 1
all 0 1984,1
data 1964,1 1984,1 AN20 AN21 AN22 AN23 AN24 AN25 AN26 AN27 AN28 AN29 AN30 $
AN31 AN32 AN33 AN34 AN35 AN36 AN37 AN38 AN39 AN40

statistics AN20 1964,1 1984,1
STATISTICS ON SERIES     1      AN20             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN              .5459524E-01      VARIANCE                  .3095034E-02
STANDARD DEVIATION       .5563303E-01      STAN. DEV. OF MEAN        .1214012E-01
T-STAT FOR MEAN=0        4.497091          SIGNIFICANCE LEVEL        .2202590E-03


statistics AN21 1964,1 1984,1
STATISTICS ON SERIES     2      AN21             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN              .9761905E-01      VARIANCE                  .1376635E-01
STANDARD DEVIATION       .1173301          STAN. DEV. OF MEAN        .2560352E-01
T-STAT FOR MEAN=0        3.812719          SIGNIFICANCE LEVEL        .1089696E-02


statistics AN22 1964,1 1984,1
STATISTICS ON SERIES     3      AN22             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN              .8570952E-02      VARIANCE                  .9948765E-02
STANDARD DEVIATION       .9974349E-01      STAN. DEV. OF MEAN        .2176581E-01
T-STAT FOR MEAN=0        .3937804          SIGNIFICANCE LEVEL        .6979099


statistics AN23 1964,1 1984,1
STATISTICS ON SERIES     4      AN23             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN              .7054429E-01      VARIANCE                  .9223238E-02
STANDARD DEVIATION       .9603769E-01      STAN. DEV. OF MEAN        .2095714E-01
T-STAT FOR MEAN=0        3.366121          SIGNIFICANCE LEVEL        .3072059E-02


statistics AN24 1964,1 1984,1
STATISTICS ON SERIES     5      AN24             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN              .5290952E-01      VARIANCE                  .6170282E-02
STANDARD DEVIATION       .7855114E-01      STAN. DEV. OF MEAN        .1714126E-01
T-STAT FOR MEAN=0        3.086676          SIGNIFICANCE LEVEL        .5817956E-02


statistics AN25 1964,1 1984,1
STATISTICS ON SERIES     6      AN25             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN              .6270952E-01      VARIANCE                  .2123009E-01
STANDARD DEVIATION       .1457055          STAN. DEV. OF MEAN        .3179555E-01
T-STAT FOR MEAN=0        1.972274          SIGNIFICANCE LEVEL        .6256579E-01
```

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STATISTICS ON SERIES     7       AN26             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .3701952E-01      VARIANCE                  .2305101E-01
STANDARD DEVIATION        .1518256          STAN. DEV. OF MEAN        .3313106E-01
T-STAT FOR MEAN=0         1.117366          SIGNIFICANCE LEVEL        .2770813


statistics AN27 1964,1 1984,1
STATISTICS ON SERIES     8       AN27             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .7276190E-01      VARIANCE                  .1568089E-01
STANDARD DEVIATION        .1252234          STAN. DEV. OF MEAN        .2732598E-01
T-STAT FOR MEAN=0         2.662737          SIGNIFICANCE LEVEL        .1494600E-01


statistics AN28 1964,1 1984,1
STATISTICS ON SERIES     9       AN28             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .8631429E-01      VARIANCE                  .9902966E-02
STANDARD DEVIATION        .9951365E-01      STAN. DEV. OF MEAN        .2171566E-01
T-STAT FOR MEAN=0         3.974749          SIGNIFICANCE LEVEL        .7463081E-03


statistics AN29 1964,1 1984,1
STATISTICS ON SERIES     10      AN29             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .3757619E-01      VARIANCE                  .5306593E-01
STANDARD DEVIATION        .2303604          STAN. DEV. OF MEAN        .5026877E-01
T-STAT FOR MEAN=0         .7475057          SIGNIFICANCE LEVEL        .4634573


statistics AN30 1964,1 1984,1
STATISTICS ON SERIES     11      AN30             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .1534762          VARIANCE                  .2503861
STANDARD DEVIATION        .5003859          STAN. DEV. OF MEAN        .1091932
T-STAT FOR MEAN=0         1.405548          SIGNIFICANCE LEVEL        .1752032


statistics AN31 1964,1 1984,1
STATISTICS ON SERIES     12      AN31             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .9649524E-01      VARIANCE                  .2314128E-01
STANDARD DEVIATION        .1521226          STAN. DEV. OF MEAN        .3319587E-01
T-STAT FOR MEAN=0         2.906845          SIGNIFICANCE LEVEL        .8719728E-02


statistics AN32 1964,1 1984,1
STATISTICS ON SERIES     13      AN32             21 OBSERVATIONS
FROM   1964:   1   UNTIL   1984:   1

SAMPLE MEAN               .1152381          VARIANCE                  .2083407
STANDARD DEVIATION        .4564435          STAN. DEV. OF MEAN        .9960414E-01
T-STAT FOR MEAN=0         1.156961          SIGNIFICANCE LEVEL        .2609206


statistics AN33 1964.1 1984.1
```

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SAMPLE MEAN                 .7857143E-01      VARIANCE                 .6439657E-02
STANDARD DEVIATION          .8024747E-01      STAN. DEV. OF MEAN       .1751143E-01
T-STAT FOR MEAN=0           4.486864          SIGNIFICANCE LEVEL       .2255704E-03


statistics AN34 1964,1 1984,1
STATISTICS ON SERIES    15      AN34         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1

SAMPLE MEAN                 .1766190          VARIANCE                 .1147973
STANDARD DEVIATION          .3388176          STAN. DEV. OF MEAN       .7393606E-01
T-STAT FOR MEAN=0           2.388808          SIGNIFICANCE LEVEL       .2687413E-01


statistics AN35 1964,1 1984,1
STATISTICS ON SERIES    16      AN35         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1

SAMPLE MEAN                 .7044429E-01      VARIANCE                 .9774105E-02
STANDARD DEVIATION          .9886407E-01      STAN. DEV. OF MEAN       .2157391E-01
T-STAT FOR MEAN=0           3.265254          SIGNIFICANCE LEVEL       .3872982E-02


statistics AN36 1964,1 1984,1
STATISTICS ON SERIES    17      AN36         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1

SAMPLE MEAN                 .3607143E-01      VARIANCE                 .1019010E-01
STANDARD DEVIATION          .1009460          STAN. DEV. OF MEAN       .2202823E-01
T-STAT FOR MEAN=0           1.637509          SIGNIFICANCE LEVEL       .1171626


statistics AN37 1964,1 1984,1
STATISTICS ON SERIES    18      AN37         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1

SAMPLE MEAN                 .6747619E-01      VARIANCE                 .1709506E-01
STANDARD DEVIATION          .1307481          STAN. DEV. OF MEAN       .2853157E-01
T-STAT FOR MEAN=0           2.364966          SIGNIFICANCE LEVEL       .2825251E-01


statistics AN38 1964,1 1984,1
STATISTICS ON SERIES    19      AN38         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1

SAMPLE MEAN                 .8293333E-01      VARIANCE                 .1913795E-01
STANDARD DEVIATION          .1383400          STAN. DEV. OF MEAN       .3018825E-01
T-STAT FOR MEAN=0           2.747205          SIGNIFICANCE LEVEL       .1242248E-01


statistics AN39 1964,1 1984,1
STATISTICS ON SERIES    20      AN39         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1

SAMPLE MEAN                 .1178190          VARIANCE                 .8059851E-01
STANDARD DEVIATION          .2838988          STAN. DEV. OF MEAN       .6195179E-01
T-STAT FOR MEAN=0           1.901786          SIGNIFICANCE LEVEL       .7170236E-01


statistics AN40 1964,1 1984,1
STATISTICS ON SERIES    21      AN40         21 OBSERVATIONS
FROM  1964:  1  UNTIL  1984:  1
```

```
T-STAT FOR MEAN=0        4.818048          SIGNIFICANCE LEVEL       .1045505E 0


end


          NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS          0 WARNINGS
```

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:pedi
cal 1971 1 1
all 0 1984,1
data 1971,1 1984,1 AN20 AN21 AN22 AN23 AN24 AN25 AN26 AN27 AN28 AN29 AN30 $
AN31 AN32 AN33 AN34 AN35 AN36 AN37 AN38 AN39 AN40

statistics AN20 1971,1 1984,1
STATISTICS ON SERIES    1     AN20              14 OBSERVATIONS
FROM   1971:  1  UNTIL   1984:  1

SAMPLE MEAN              .3846429E-01     VARIANCE                .2962701E-02
STANDARD DEVIATION       .5443070E-01     STAN. DEV. OF MEAN      .1454722E-01
T-STAT FOR MEAN=0        2.644099         SIGNIFICANCE LEVEL      .2023762E-01


statistics AN21 1971,1 1984,1
STATISTICS ON SERIES    2     AN21              14 OBSERVATIONS
FROM   1971:  1  UNTIL   1984:  1

SAMPLE MEAN              .6221429E-01     VARIANCE                .5728181E-02
STANDARD DEVIATION       .7568475E-01     STAN. DEV. OF MEAN      .2022760E-01
T-STAT FOR MEAN=0        3.075713         SIGNIFICANCE LEVEL      .8851008E-02


statistics AN22 1971,1 1984,1
STATISTICS ON SERIES    3     AN22              14 OBSERVATIONS
FROM   1971:  1  UNTIL   1984:  1

SAMPLE MEAN              .9570714E-02     VARIANCE                .1043951E-01
STANDARD DEVIATION       .1021739         STAN. DEV. OF MEAN      .2730713E-01
T-STAT FOR MEAN=0        .3504841         SIGNIFICANCE LEVEL      .7315893


statistics AN23 1971,1 1984,1
STATISTICS ON SERIES    4     AN23              14 OBSERVATIONS
FROM   1971:  1  UNTIL   1984:  1

SAMPLE MEAN              .5257143E-01     VARIANCE                .1154196E-01
STANDARD DEVIATION       .1074335         STAN. DEV. OF MEAN      .2871281E-01
T-STAT FOR MEAN=0        1.830940         SIGNIFICANCE LEVEL      .9011930E-01


statistics AN24 1971,1 1984,1
STATISTICS ON SERIES    5     AN24              14 OBSERVATIONS
FROM   1971:  1  UNTIL   1984:  1

SAMPLE MEAN              .3822143E-01     VARIANCE                .4858856E-02
STANDARD DEVIATION       .6970549E-01     STAN. DEV. OF MEAN      .1862958E-01
T-STAT FOR MEAN=0        2.051653         SIGNIFICANCE LEVEL      .6091480E-01


statistics AN25 1971,1 1984,1
STATISTICS ON SERIES    6     AN25              14 OBSERVATIONS
FROM   1971:  1  UNTIL   1984:  1

SAMPLE MEAN              .3384286E-01     VARIANCE                .2461539E-01
STANDARD DEVIATION       .1568929         STAN. DEV. OF MEAN      .4193140E-01
T-STAT FOR MEAN=0        .8071006         SIGNIFICANCE LEVEL      .4341274


statistics AN26 1971,1 1984,1
```

```
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN            -.1954214E-01     VARIANCE                .1642247E-01
STANDARD DEVIATION      .1281502         STAN. DEV. OF MEAN      .3424957E-01
T-STAT FOR MEAN=0      -.5705806         SIGNIFICANCE LEVEL      .5780136


statistics AN27 1971,1 1984,1
STATISTICS ON SERIES    8     AN27           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN             .6900000E-01     VARIANCE                .1673246E-01
STANDARD DEVIATION      .1293540         STAN. DEV. OF MEAN      .3457132E-01
T-STAT FOR MEAN=0      1.995874          SIGNIFICANCE LEVEL      .6733584E-01


statistics AN28 1971,1 1984,1
STATISTICS ON SERIES    9     AN28           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN             .6161429E-01     VARIANCE                .4325086E-02
STANDARD DEVIATION      .6576539E-01     STAN. DEV. OF MEAN      .1757654E-01
T-STAT FOR MEAN=0      3.505485          SIGNIFICANCE LEVEL      .3873104E-02


statistics AN29 1971,1 1984,1
STATISTICS ON SERIES    10    AN29           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN            -.1564286E-02     VARIANCE                .1665806E-01
STANDARD DEVIATION      .1290661         STAN. DEV. OF MEAN      .3449437E-01
T-STAT FOR MEAN=0      -.4534902E-01     SIGNIFICANCE LEVEL      .9645183


statistics AN30 1971,1 1984,1
STATISTICS ON SERIES    11    AN30           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN             .5378571E-01     VARIANCE                .7751874E-02
STANDARD DEVIATION      .8804473E-01     STAN. DEV. OF MEAN      .2353094E-01
T-STAT FOR MEAN=0      2.285744          SIGNIFICANCE LEVEL      .3969435E-01


statistics AN31 1971,1 1984,1
STATISTICS ON SERIES    12    AN31           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN             .4788571E-01     VARIANCE                .5508074E-02
STANDARD DEVIATION      .7421640E-01     STAN. DEV. OF MEAN      .1983517E-01
T-STAT FOR MEAN=0      2.414183          SIGNIFICANCE LEVEL      .3124397E-01


statistics AN32 1971,1 1984,1
STATISTICS ON SERIES    13    AN32           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN             .1226429         VARIANCE                .2954649
STANDARD DEVIATION      .5435668         STAN. DEV. OF MEAN      .1452743
T-STAT FOR MEAN=0       .8442156         SIGNIFICANCE LEVEL      .4138150


statistics AN33 1971,1 1984,1
STATISTICS ON SERIES    14    AN33           14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1
```

```
SAMPLE MEAN               .4892857E-01       VARIANCE                     .4460225E-02
STANDARD DEVIATION        .6678492E-01       STAN. DEV. OF MEAN           .1784902E-01
T-STAT FOR MEAN=0         2.741247           SIGNIFICANCE LEVEL           .1681671E-01


statistics AN34 1971,1 1984,1
STATISTICS ON SERIES    15      AN34             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .5328571E-01       VARIANCE                     .5290853E-01
STANDARD DEVIATION        .2300185           STAN. DEV. OF MEAN           .6147504E-01
T-STAT FOR MEAN=0         .8667862           SIGNIFICANCE LEVEL           .4017749


statistics AN35 1971,1 1984,1
STATISTICS ON SERIES    16      AN35             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .5264286E-01       VARIANCE                     .1207979E-01
STANDARD DEVIATION        .1099081           STAN. DEV. OF MEAN           .2937417E-01
T-STAT FOR MEAN=0         1.792148           SIGNIFICANCE LEVEL           .9640129E-01


statistics AN36 1971,1 1984,1
STATISTICS ON SERIES    17      AN36             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .1321429E-02       VARIANCE                     .1063559E-01
STANDARD DEVIATION        .1031290           STAN. DEV. OF MEAN           .2756239E-01
T-STAT FOR MEAN=0         .4794318E-01       SIGNIFICANCE LEVEL           .9624903


statistics AN37 1971,1 1984,1
STATISTICS ON SERIES    18      AN37             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .2250000E-01       VARIANCE                     .1749719E-01
STANDARD DEVIATION        .1322770           STAN. DEV. OF MEAN           .3535250E-01
T-STAT FOR MEAN=0         .6364472           SIGNIFICANCE LEVEL           .5355310


statistics AN38 1971,1 1984,1
STATISTICS ON SERIES    19      AN38             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .5875714E-01       VARIANCE                     .8566075E-02
STANDARD DEVIATION        .9255309E-01       STAN. DEV. OF MEAN           .2473585E-01
T-STAT FOR MEAN=0         2.375384           SIGNIFICANCE LEVEL           .3359646E-01


statistics AN39 1971,1 1984,1
STATISTICS ON SERIES    20      AN39             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .5550000E-01       VARIANCE                     .1195873E-01
STANDARD DEVIATION        .1093560           STAN. DEV. OF MEAN           .2922662E-01
T-STAT FOR MEAN=0         1.898954           SIGNIFICANCE LEVEL           .7998878E-01


statistics AN40 1971,1 1984,1
STATISTICS ON SERIES    21      AN40             14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .4167143E-01       VARIANCE                     .3850527E-02
```

```
[illegible]LE MEAN        .3571429E-03     VARIANCE                 .1966092E-02
[illegible]DARD DEVIATION .4434063E-01     STAN. DEV. OF MEAN       .1185053E-01
[illegible]IAT FOR MEAN=0 .3013728E-01     SIGNIFICANCE LEVEL       .9764153
```

```
      NORMAL COMPLETION OF JOB
             HALT AT     0
                 0 ERRORS          0 WARNINGS
```

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RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:megas
cal 1971 1 1
all 0 1984,1
data 1971,1 1984,1 AN20 AN21 AN22 AN23 AN24 AN25 AN26 AN27 AN28 AN29 AN30 $
AN31 AN32 AN33 AN34 AN35 AN36 AN37 AN38 AN39 AN40


statistics AN20 1971,1 1984,1
STATISTICS ON SERIES     1      AN20              14 OBSERVATIONS
FROM   1971:   1  UNTIL   1984:   1

SAMPLE MEAN                .3040000E-01      VARIANCE                  .3605811E-02
STANDARD DEVIATION         .6004840E-01      STAN. DEV. OF MEAN        .1604861E-01
T-STAT FOR MEAN=0          1.894245          SIGNIFICANCE LEVEL        .8065546E-01


statistics AN21 1971,1 1984,1
STATISTICS ON SERIES     2      AN21              14 OBSERVATIONS
FROM   1971:   1  UNTIL   1984:   1

SAMPLE MEAN               -.5142857E-02      VARIANCE                  .6135516E-02
STANDARD DEVIATION         .7832954E-01      STAN. DEV. OF MEAN        .2093445E-01
T-STAT FOR MEAN=0         -.2456648          SIGNIFICANCE LEVEL        .8097776


statistics AN22 1971,1 1984,1
STATISTICS ON SERIES     3      AN22              14 OBSERVATIONS
FROM   1971:   1  UNTIL   1984:   1

SAMPLE MEAN               -.1467143E-01      VARIANCE                  .6667907E-02
STANDARD DEVIATION         .8165725E-01      STAN. DEV. OF MEAN        .2182382E-01
T-STAT FOR MEAN=0         -.6722668          SIGNIFICANCE LEVEL        .5131856


statistics AN23 1971,1 1984,1
STATISTICS ON SERIES     4      AN23              14 OBSERVATIONS
FROM   1971:   1  UNTIL   1984:   1

SAMPLE MEAN               -.4709286E-01      VARIANCE                  .1410355E-01
STANDARD DEVIATION         .1187584          STAN. DEV. OF MEAN        .3173951E-01
T-STAT FOR MEAN=0         -1.483730          SIGNIFICANCE LEVEL        .1617170


statistics AN24 1971,1 1984,1
STATISTICS ON SERIES     5      AN24              14 OBSERVATIONS
FROM   1971:   1  UNTIL   1984:   1

SAMPLE MEAN               -.1014286E-02      VARIANCE                  .3685480E-02
STANDARD DEVIATION         .6070815E-01      STAN. DEV. OF MEAN        .1622494E-01
T-STAT FOR MEAN=0         -.6251400E-01      SIGNIFICANCE LEVEL        .9511045


statistics AN25 1971,1 1984,1
STATISTICS ON SERIES     6      AN25              14 OBSERVATIONS
FROM   1971:   1  UNTIL   1984:   1

SAMPLE MEAN               -.8521429E-02      VARIANCE                  .5074391E-02
STANDARD DEVIATION         .7123476E-01      STAN. DEV. OF MEAN        .1903829E-01
T-STAT FOR MEAN=0         -.4475942          SIGNIFICANCE LEVEL        .6618136
```

STANDARD DEVIATION	.6678492E-01	STAN. DEV. OF MEAN	.1784902E-01
T-STAT FOR MEAN=0	2.741247	SIGNIFICANCE LEVEL	.1681671E-01

statistics AN34 1971,1 1984,1
STATISTICS ON SERIES 15 AN34 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	.5328571E-01	VARIANCE	.5290853E-01
STANDARD DEVIATION	.2300185	STAN. DEV. OF MEAN	.6147504E-01
T-STAT FOR MEAN=0	.8667862	SIGNIFICANCE LEVEL	.4017749

statistics AN35 1971,1 1984,1
STATISTICS ON SERIES 16 AN35 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	.5264286E-01	VARIANCE	.1207979E-01
STANDARD DEVIATION	.1099081	STAN. DEV. OF MEAN	.2937417E-01
T-STAT FOR MEAN=0	1.792148	SIGNIFICANCE LEVEL	.9640129E-01

statistics AN36 1971,1 1984,1
STATISTICS ON SERIES 17 AN36 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	.1321429E-02	VARIANCE	.1063559E-01
STANDARD DEVIATION	.1031290	STAN. DEV. OF MEAN	.2756239E-01
T-STAT FOR MEAN=0	.4794318E-01	SIGNIFICANCE LEVEL	.9624903

statistics AN37 1971,1 1984,1
STATISTICS ON SERIES 18 AN37 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	.2250000E-01	VARIANCE	.1749719E-01
STANDARD DEVIATION	.1322770	STAN. DEV. OF MEAN	.3535250E-01
T-STAT FOR MEAN=0	.6364472	SIGNIFICANCE LEVEL	.5355310

statistics AN38 1971,1 1984,1
STATISTICS ON SERIES 19 AN38 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	.5875714E-01	VARIANCE	.8566075E-02
STANDARD DEVIATION	.9255309E-01	STAN. DEV. OF MEAN	.2473585E-01
T-STAT FOR MEAN=0	2.375384	SIGNIFICANCE LEVEL	.3359646E-01

statistics AN39 1971,1 1984,1
STATISTICS ON SERIES 20 AN39 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	.5550000E-01	VARIANCE	.1195873E-01
STANDARD DEVIATION	.1093560	STAN. DEV. OF MEAN.	.2922662E-01
T-STAT FOR MEAN=0	1.898954	SIGNIFICANCE LEVEL	.7998878E-01

statistics AN40 1971,1 1984,1
STATISTICS ON SERIES 21 AN40 14 OBSERVATIONS
FROM 1971: 1 UNTIL 1984: 1

SAMPLE MEAN	[illegible]	VARIANCE	[illegible]

```
SAMPLE MEAN              -.1954214E-01      VARIANCE                  .1642247E-01
STANDARD DEVIATION        .1281502          STAN. DEV. OF MEAN        .3424957E-01
T-STAT FOR MEAN=0        -.5705806          SIGNIFICANCE LEVEL        .5780136


statistics AN27 1971,1 1984,1
STATISTICS ON SERIES    8      AN27            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .6900000E-01      VARIANCE                  .1673246E-01
STANDARD DEVIATION        .1293540          STAN. DEV. OF MEAN        .3457132E-01
T-STAT FOR MEAN=0         1.995874          SIGNIFICANCE LEVEL        .6733584E-01


statistics AN28 1971,1 1984,1
STATISTICS ON SERIES    9      AN28            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .6161429E-01      VARIANCE                  .4325086E-02
STANDARD DEVIATION        .6576539E-01      STAN. DEV. OF MEAN        .1757654E-01
T-STAT FOR MEAN=0         3.505485          SIGNIFICANCE LEVEL        .3873104E-02


statistics AN29 1971,1 1984,1
STATISTICS ON SERIES    10     AN29            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN              -.1564286E-02      VARIANCE                  .1665806E-01
STANDARD DEVIATION        .1290661          STAN. DEV. OF MEAN        .3449437E-01
T-STAT FOR MEAN=0        -.4534902E-01      SIGNIFICANCE LEVEL        .9645183


statistics AN30 1971,1 1984,1
STATISTICS ON SERIES    11     AN30            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .5378571E-01      VARIANCE                  .7751874E-02
STANDARD DEVIATION        .8804473E-01      STAN. DEV. OF MEAN        .2353094E-01
T-STAT FOR MEAN=0         2.285744          SIGNIFICANCE LEVEL        .3969435E-01


statistics AN31 1971,1 1984,1
STATISTICS ON SERIES    12     AN31            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .4788571E-01      VARIANCE                  .5508074E-02
STANDARD DEVIATION        .7421640E-01      STAN. DEV. OF MEAN        .1983517E-01
T-STAT FOR MEAN=0         2.414183          SIGNIFICANCE LEVEL        .3124397E-01


statistics AN32 1971,1 1984,1
STATISTICS ON SERIES    13     AN32            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1

SAMPLE MEAN               .1226429          VARIANCE                  .2954649
STANDARD DEVIATION        .5435668          STAN. DEV. OF MEAN        .1452743
T-STAT FOR MEAN=0         .8442156          SIGNIFICANCE LEVEL        .4138150


statistics AN33 1971,1 1984,1
STATISTICS ON SERIES    14     AN33            14 OBSERVATIONS
FROM  1971:  1  UNTIL  1984:  1
```

```
RATSSM Version 2.02.   08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:babas
cal 1964 1 1
all 0 1984,1
data 1964,1 1984,1 AN20 AN21 AN22 AN23 AN24 AN25 AN26 AN27 AN28 AN29 AN30 $
AN31 AN32 AN33 AN34 AN35 AN36 AN37 AN38 AN39 AN40

set AD20 1964,1 1984,1 = (AN20(t)-0.05459524)
set AD21 1964,1 1984,1 = (AN21(t)-0.09761905)
set AD22 1964,1 1984,1 = (AN22(t)-0.008570952)
set AD23 1964,1 1984,1 = (AN23(t)-0.07054429)
set AD24 1964,1 1984,1 = (AN24(t)-0.05290952)
set AD25 1964,1 1984,1 = (AN25(t)-0.06270952)
set AD26 1964,1 1984,1 = (AN26(t)-0.03701952)
set AD27 1964,1 1984,1 = (AN27(t)-0.07276190)
set AD28 1964,1 1984,1 = (AN28(t)-0.08631429)
set AD29 1964,1 1984,1 = (AN29(t)-0.03757619)
set AD30 1964,1 1984,1 = (AN30(t)-0.1534762)
set AD31 1964,1 1984,1 = (AN31(t)-0.09649524)
set AD32 1964,1 1984,1 = (AN32(t)-0.1152381)
set AD33 1964,1 1984,1 = (AN33(t)-0.07857143)
set AD34 1964,1 1984,1 = (AN34(t)-0.1766190)
set AD35 1964,1 1984,1 = (AN35(t)-0.07044429)
set AD36 1964,1 1984,1 = (AN36(t)-0.03607143)
set AD37 1964,1 1984,1 = (AN37(t)-0.06747619)
set AD38 1964,1 1984,1 = (AN38(t)-0.08293333)
set AD39 1964,1 1984,1 = (AN39(t)-0.1178190)
set AD40 1964,1 1984,1 = (AN40(t)-0.06716190)
print 1964,1 1984,1 AD20 AD21 AD22 AD23 AD24 AD25 AD26 AD27 AD28 AD29 AD30 $
AD31 AD32 AD33 AD34 AD35 AD36 AD37 AD38 AD39 AD40
```

ENTRY	AD20 22	AD21 23	AD22 24	AD23 25
1	-.315952E-01	.342381	.161429	.594557E-01
2	.314048E-01	-.126191E-01	.714290E-01	.994557E-01
3	.654048E-01	.623810E-01	.284290E-01	-.701143E-01
4	-.255952E-01	-.118619	-.158571	.294557E-01
5	.854048E-01	.423809E-01	-.657095E-02	.994557E-01
6	.354048E-01	-.326191E-01	-.515710E-01	.274557E-01
7	.654048E-01	.212381	-.585710E-01	.645571E-02
8	.174048E-01	.123809E-01	.234290E-01	.109456
9	.340476E-02	.623810E-01	-.525710E-01	.694557E-01
10	.264048E-01	-.561905E-02	-.605710E-01	.129456
11	-.562952E-01	-.162619	.284290E-01	-.845443E-01
12	.364048E-01	.238095E-02	.151429	.394557E-01
13	.314048E-01	-.156191E-01	.241429	.169456
14	.740476E-02	.102381	-.605710E-01	-.114544
15	.954048E-01	-.126191E-01	-.315710E-01	-.575443E-01
16	-.463952E-01	-.486191E-01	.104290E-01	-.854429E-02
17	-.855952E-01	-.561905E-02	-.118571	-.131544
18	-.415952E-01	-.756191E-01	-.100571	-.905443E-01
19	-.775952E-01	-.856191E-01	.894290E-01	-.180544
20	-.695952E-01	-.147619	-.758095E-02	-.945443E-01
21	-.665952E-01	-.115619	-.985710E-01	-.654429E-02

ENTRY	AD24 26	AD25 27	AD26 28	AD27 29
1	.117090	.972905E-01	.162980	.107238
2	-.699095E-01	.672905E-01	.929805E-01	.142381E-01
3	.160905E-01	.629048E-02	.189805E-01	.572381E-01
4	.157090	.472905E-01	.302980	-.207619E-01
5	-.879095E-01	-.716095E-01	.122980	.127238
6	-.390952E-02	-.970952E-02	.212980	.202381E-01
7	.770905E-01	.267290	-.122020	-.252762
8	.430905E-01	.672905E-01	.829805E-01	-.547619E-01
9	.570905E-01	.282905E-01	.609805E-01	.872381E-01
10	.230905E-01	.217290	.929805E-01	[illegible]

12	[illegible]	[illegible]	[illegible]	[illegible]
13	.570905E-01	-.107710	.929805E-01	-.122762
14	-.189095E-01	-.307095E-01	-.363095E-01	-.877619E-01
15	.110905E-01	-.447095E-01	.829805E-01	.972381E-01
16	.140905E-01	.177290	-.157020	.117238
17	-.112910	-.407095E-01	-.247020	-.557619E-01
18	-.136910	-.242710	-.250195E-01	.182381E-01
19	.570905E-01	-.129710	-.101020	-.168762
20	-.869095E-01	-.599095E-01	-.207020	-.101762
21	-.508095E-01	-.202710	-.187020	.372381E-01

ENTRY	AD28 30	AD29 31	AD30 32	AD31 33
1	-.101314	-.437576	-.433476	.243505
2	.168571E-02	.342381E-02	-.463476	.433505
3	.436857E-01	.924238E-01	-.434762E-01	-.804952E-01
4	-.493143E-01	.762424	2.07652	-.216495
5	.736857E-01	.182424	-.334762E-01	.135048E-01
6	.436857E-01	.324238E-01	.206524	.233505
7	.333686	-.875762E-01	.865238E-01	.535048E-01
8	-.789143E-01	.112424	.265238E-01	.735048E-01
9	-.231429E-02	.624238E-01	.652380E-02	.535048E-01
10	-.108314	.122424	.652380E-02	-.514952E-01
11	-.841143E-01	-.104576	-.192476	-.644952E-01
12	.103686	-.318762E-01	.265238E-01	.335048E-01
13	-.103314	-.675762E-01	-.127476	-.897952E-01
14	-.263143E-01	-.128576	-.864762E-01	-.157495
15	.668571E-02	-.115576	-.121476	.135048E-01
16	.136857E-01	-.391762E-01	-.176476	-.130495
17	.336857E-01	-.197576	-.213476	.350476E-02
18	-.453143E-01	-.167576	-.141476	-.128495
19	-.231429E-02	-.237576	-.554762E-01	-.105595
20	.536857E-01	.724238E-01	-.211476	-.986952E-01
21	-.106314	.172424	-.135476	-.314952E-01

ENTRY	AD32 34	AD33 35	AD34 36	AD35 37
1	-.295238	.121429	-.856190E-01	.109556
2	-.202238	.121429	-.204619	-.114443E-01
3	.114762	-.445714E-01	1.01338	.495557E-01
4	.324762	-.375714E-01	.123381	-.711143E-01
5	.447619E-01	.814286E-01	.133381	.355571E-02
6	.144762	.414286E-01	.433381	.895557E-01
7	-.235238	.131429	.313381	.795557E-01
8	.347619E-01	-.557143E-02	-.326619	.125557E-01
9	-.525238	-.955714E-01	-.206619	.119556
10	1.79476	.414286E-01	.423381	.149556
11	-.285238	-.315714E-01	-.244619	-.180444
12	-.402381E-01	-.435714E-01	-.242619	-.210444
13	-.235238	.314286E-01	-.966190E-01	.995557E-01
14	-.160238	.714286E-01	-.366619	.555710E-03
15	-.592381E-01	.742857E-02	.133810E-01	-.374443E-01
16	.224762	.314286E-01	-.115619	-.114443E-01
17	-.882381E-01	.442857E-02	-.107619	-.214443E-01
18	-.182381E-01	-.665714E-01	-.316619	-.744429E-02
19	-.295238	-.140571	-.376619	-.132444
20	-.104238	-.133571	.203381	-.109444
21	-.139238	-.855714E-01	.333810E-01	.795557E-01

ENTRY	AD36 38	AD37 39	AD38 40	AD39 41
1	.143929	.212524	-.393333E-02	.932181
2	.229286E-01	-.747619E-02	-.269333E-01	-.758190E-01
3	.469286E-01	.102524	-.409333E-01	.221810E-01
4	.509286E-01	.112524	-.181933	-.547819
5	.839286E-01	.245238E-01	-.193333E-02	.332181
6	.123929	.925238E-01	.137067	-.112619
7	.139286E-01	.925238E-01	.457067	.322181
8	.839286E-01	.202524	.177067	.121810E-01
9	.609286E-01	.625238E-01	-.629333E-01	.218100E-02
10	[illegible]	[illegible]	[illegible]	[illegible]

13	.149286E-01	.142524	-.559333E-01	.821810E-01
14	-.376714E-01	-.954762E-01	.170667E-01	-.548190E-01
15	-.429714E-01	-.394762E-01	-.679333E-01	-.133819
16	-.107071	-.424762E-01	.570667E-01	-.257819
17	-.236071	.305238E-01	.406667E-02	-.169819
18	.239286E-01	-.564762E-01	-.259333E-01	-.208819
19	-.146071	-.167476	-.787333E-01	-.558190E-01
20	-.176071	-.394762E-01	-.181933	-.164819
21	-.950714E-01	-.187476	-.142933	.421810E-01

ENTRY	AD40 42
1	.628381E-01
2	.328381E-01
3	.228381E-01
4	.198381E-01
5	.528381E-01
6	.828381E-01
7	.828381E-01
8	.428381E-01
9	.118381E-01
10	.112838
11	-.951619E-01
12	-.121619E-01
13	.318381E-01
14	-.531619E-01
15	-.116190E-02
16	-.121619E-01
17	-.657619E-01
18	-.791619E-01
19	-.109162
20	-.801619E-01
21	-.481619E-01

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:pedi
cal 1971 1 1
all 0 1984,1
data 1971,1 1984,1 AN20 AN21 AN22 AN23 AN24 AN25 AN26 AN27 AN28 AN29 AN30 $
AN31 AN32 AN33 AN34 AN35 AN36 AN37 AN38 AN39 AN40

set AD20 1971,1 1984,1 = (AN20(t)-0.03846429)
set AD21 1971,1 1984,1 = (AN21(t)-0.06221429)
set AD22 1971,1 1984,1 = (AN22(t)-0.009570714)
set AD23 1971,1 1984,1 = (AN23(t)-0.05257143)
set AD24 1971,1 1984,1 = (AN24(t)-0.03822143)
set AD25 1971,1 1984,1 = (AN25(t)-0.03384286)
set AD26 1971,1 1984,1 = (AN26(t)+0.01954214)
set AD27 1971,1 1984,1 = (AN27(t)-0.069)
set AD28 1971,1 1984,1 = (AN28(t)-0.06161429)
set AD29 1971,1 1984,1 = (AN29(t)+0.001564286)
set AD30 1971,1 1984,1 = (AN30(t)-0.05378571)
set AD31 1971,1 1984,1 = (AN31(t)-0.04788571)
set AD32 1971,1 1984,1 = (AN32(t)-0.1226429)
set AD33 1971,1 1984,1 = (AN33(t)-0.04892857)
set AD34 1971,1 1984,1 = (AN34(t)-0.05328571)
set AD35 1971,1 1984,1 = (AN35(t)-0.05264286)
set AD36 1971,1 1984,1 = (AN36(t)-0.001321429)
set AD37 1971,1 1984,1 = (AN37(t)-0.0225)
set AD38 1971,1 1984,1 = (AN38(t)-0.05875714)
set AD39 1971,1 1984,1 = (AN39(t)-0.0555)
set AD40 1971,1 1984,1 = (AN40(t)-0.04167143)
print 1971,1 1984,1 AD20 AD21 AD22 AD23 AD24 AD25 AD26 AD27 AD28 AD29 AD30 $
AD31 AD32 AD33 AD34 AD35 AD36 AD37 AD38 AD39 AD40
```

ENTRY	AD20 22	AD21 23	AD22 24	AD23 25
1	.335357E-01	.477857E-01	.224293E-01	.127429
2	.195357E-01	.977857E-01	-.535707E-01	.874286E-01
3	.425357E-01	.297857E-01	-.615707E-01	.147429
4	-.401643E-01	-.127214	.274293E-01	-.665714E-01
5	.525357E-01	.377857E-01	.150429	.574286E-01
6	.475357E-01	.197857E-01	.240429	.187429
7	.235357E-01	.137786	-.615707E-01	-.965714E-01
8	.111536	.227857E-01	-.325707E-01	-.395714E-01
9	-.302643E-01	-.132143E-01	.942929E-02	.942857E-02
10	-.694643E-01	.297857E-01	-.119571	-.113571
11	-.254643E-01	-.402143E-01	-.101571	-.725714E-01
12	-.614643E-01	-.502143E-01	.884293E-01	-.162571
13	-.534643E-01	-.112214	-.858071E-02	-.765714E-01
14	-.504643E-01	-.802143E-01	-.995707E-01	.114286E-01

ENTRY	AD24 26	AD25 27	AD26 28	AD27 29
1	.577786E-01	.961571E-01	.139542	-.510000E-01
2	.717786E-01	.571571E-01	.117542	.910000E-01
3	.377786E-01	.246157	.149542	.231000
4	-.862214E-01	-.223843	-.160458	.161000
5	.537786E-01	.246157	.292421E-01	-.199000
6	.717786E-01	-.788429E-01	.149542	-.119000
7	-.422143E-02	-.184286E-02	.202521E-01	-.840000E-01
8	.257786E-01	-.158429E-01	.139542	.101000
9	.287786E-01	.206157	-.100458	.121000
10	-.982214E-01	-.118429E-01	-.190458	-.520000E-01
11	-.122221	-.213843	.315421E-01	.220000E-01
12	.717786E-01	-.100843	-.444579E-01	-.165000
13	-.722214E-01	-.310429E-01	-.150458	-.980000E-01
14	-.361214E-01	-.173843	-.130458	.410000E-01

ENTRY	AD28 30	AD29 31	AD30 32	AD31 33

4	-.594143E-01	-.654357E-01	-.927857E-01	-.158857E-01
5	.128386	.726429E-02	.126214	.821143E-01
6	-.786143E-01	-.284357E-01	-.277857E-01	-.411857E-01
7	-.161429E-02	-.894357E-01	.132143E-01	-.108886
8	.313857E-01	-.764357E-01	-.217857E-01	.621143E-01
9	.383857E-01	-.357140E-04	-.767857E-01	-.818857E-01
10	.583857E-01	-.158436	-.113786	.521143E-01
11	-.206143E-01	-.128436	-.417857E-01	-.798857E-01
12	.223857E-01	-.198436	.442143E-01	-.569857E-01
13	.783857E-01	.111564	-.111786	-.500857E-01
14	-.816143E-01	.211564	-.357857E-01	.171143E-01

ENTRY	AD32 34	AD33 35	AD34 36	AD35 37
1	.273571E-01	.240714E-01	-.203286	.303571E-01
2	-.532643	-.659286E-01	-.832857E-01	.137357
3	1.78736	.710714E-01	.546714	.167357
4	-.292643	-.192857E-02	-.121286	-.162643
5	-.476429E-01	-.139286E-01	-.119286	-.192643
6	-.242643	.610714E-01	.267143E-01	.117357
7	-.167643	.101071	-.243286	.183571E-01
8	-.666429E-01	.370714E-01	.136714	-.196429E-01
9	.217357	.610714E-01	.771429E-02	.635714E-02
10	-.956429E-01	.340714E-01	.157143E-01	-.364286E-02
11	-.256429E-01	-.369286E-01	-.193286	.103571E-01
12	-.302643	-.110929	-.253286	-.114643
13	-.111643	-.103929	.326714	-.916429E-01
14	-.146643	-.559286E-01	.156714	.973571E-01

ENTRY	AD36 38	AD37 39	AD38 40	AD39 41
1	.118679	.247500	.201243	.745000E-01
2	.956786E-01	.107500	-.387571E-01	.645000E-01
3	.128679	.705000E-01	.912429E-01	.125000E-01
4	.716786E-01	-.172500	.612429E-01	.545000E-01
5	.746786E-01	-.202500	-.573571E-01	.154500
6	.496786E-01	.187500	-.317571E-01	.144500
7	-.292143E-02	-.505000E-01	.412429E-01	.750000E-02
8	-.822143E-02	.550000E-02	-.437571E-01	-.715000E-01
9	-.723214E-01	.250000E-02	.812429E-01	-.195500
10	-.201321	.755000E-01	.282429E-01	-.107500
11	.586786E-01	-.115000E-01	-.175714E-02	-.146500
12	-.111321	-.122500	-.545571E-01	.650000E-02
13	-.141321	.550000E-02	-.157757	-.102500
14	-.603214E-01	-.142500	-.118757	.104500

ENTRY	AD40 42
1	.683286E-01
2	.373286E-01
3	.138329
4	-.696714E-01
5	.133286E-01
6	.573286E-01
7	-.276714E-01
8	.243286E-01
9	.133286E-01
10	-.402714E-01
11	-.536714E-01
12	-.836714E-01
13	-.546714E-01
14	-.226714E-01

end

NORMAL COMPLETION OF JOB

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:trend
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 GD20 GD21 GD22 GD23 GD24 GD25 GD26 GD27 GD28 GD29 GD30 $
GD31 GD32 GD33 GD34 GD35 GD36 GD37 GD38 GD39 GD40
statistics GD20 1963,1 1984,1
STATISTICS ON SERIES     1      GD20            22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                12383.45        VARIANCE                .1960528E+08
STANDARD DEVIATION         4427.785        STAN. DEV. OF MEAN      944.0070
T-STAT FOR MEAN=0          13.11797        SIGNIFICANCE LEVEL      .3732837E-08


statistics GD21 1963,1 1984,1
STATISTICS ON SERIES     2      GD21            22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                3371.818        VARIANCE                2871551.
STANDARD DEVIATION         1694.565        STAN. DEV. OF MEAN      361.2825
T-STAT FOR MEAN=0          9.332914        SIGNIFICANCE LEVEL      .1011795E-07


statistics GD22 1963,1 1984,1
STATISTICS ON SERIES     3      GD22            22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                1958.091        VARIANCE                54088.37
STANDARD DEVIATION         232.5691        STAN. DEV. OF MEAN      49.58389
T-STAT FOR MEAN=0          39.49046        SIGNIFICANCE LEVEL      .3718988E-08


statistics GD23 1963,1 1984,1
STATISTICS ON SERIES     4      GD23            22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                15360.59        VARIANCE                .4327142E+08
STANDARD DEVIATION         6578.101        STAN. DEV. OF MEAN      1402.456
T-STAT FOR MEAN=0          10.95264        SIGNIFICANCE LEVEL      .4103782E-08


statistics GD24 1963,1 1984,1
STATISTICS ON SERIES     5      GD24            22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                8685.136        VARIANCE                7619282.
STANDARD DEVIATION         2760.305        STAN. DEV. OF MEAN      588.4989
T-STAT FOR MEAN=0          14.75812        SIGNIFICANCE LEVEL      .3720459E-08


statistics GD25 1963,1 1984,1
STATISTICS ON SERIES     6      GD25            22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                3116.045        VARIANCE                1537780.
STANDARD DEVIATION         1240.073        STAN. DEV. OF MEAN      264.3844
T-STAT FOR MEAN=0          11.78604        SIGNIFICANCE LEVEL      .3820381E-08


statistics GD26 1963,1 1984,1
```

```
SAMPLE MEAN                 2112.000        VARIANCE                    444293.6
STANDARD DEVIATION          666.5535        STAN. DEV. OF MEAN          142.1097
T-STAT FOR MEAN=0           14.86176        SIGNIFICANCE LEVEL          .3720274E-08


statistics GD27 1963,1 1984,1
STATISTICS ON SERIES     8      GD27           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                 1944.136        VARIANCE                    548421.6
STANDARD DEVIATION          740.5549        STAN. DEV. OF MEAN          157.8868
T-STAT FOR MEAN=0           12.31348        SIGNIFICANCE LEVEL          .3764179E-08


statistics GD28 1963,1 1984,1
STATISTICS ON SERIES     9      GD28           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                 2552.909        VARIANCE                    1637542.
STANDARD DEVIATION          1279.665        STAN. DEV. OF MEAN          272.8255
T-STAT FOR MEAN=0           9.357298        SIGNIFICANCE LEVEL          .9838665E-08


statistics GD29 1963,1 1984,1
STATISTICS ON SERIES     10     GD29           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                 1102.000        VARIANCE                    138281.7
STANDARD DEVIATION          371.8625        STAN. DEV. OF MEAN          79.28135
T-STAT FOR MEAN=0           13.89986        SIGNIFICANCE LEVEL          .3723618E-08


statistics GD30 1963,1 1984,1
STATISTICS ON SERIES     11     GD30           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                 2700.182        VARIANCE                    2120082.
STANDARD DEVIATION          1456.050        STAN. DEV. OF MEAN          310.4309
T-STAT FOR MEAN=0           8.698173        SIGNIFICANCE LEVEL          .2471054E-07


statistics GD31 1963,1 1984,1
STATISTICS ON SERIES     12     GD31           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                 5762.500        VARIANCE                    5576212.
STANDARD DEVIATION          2361.400        STAN. DEV. OF MEAN          503.4522
T-STAT FOR MEAN=0           11.44597        SIGNIFICANCE LEVEL          .3892210E-08


statistics GD32 1963,1 1984,1
STATISTICS ON SERIES     13     GD32           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1

SAMPLE MEAN                 2399.955        VARIANCE                    1149819.
STANDARD DEVIATION          1072.296        STAN. DEV. OF MEAN          228.6143
T-STAT FOR MEAN=0           10.49783        SIGNIFICANCE LEVEL          .4540937E-08


statistics GD33 1963,1 1984,1
STATISTICS ON SERIES     14     GD33           22 OBSERVATIONS
FROM  1963:  1  UNTIL  1984:  1
```

```
T-STAT FOR MEAN=0         10.36015            SIGNIFICANCE LEVEL       .4757948E-08


statistics GD34 1963,1 1984,1
STATISTICS ON SERIES    15      GD34             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               4905.909            VARIANCE                 6686894.
STANDARD DEVIATION        2585.903            STAN. DEV. OF MEAN       551.3164
T-STAT FOR MEAN=0         8.898537            SIGNIFICANCE LEVEL       .1806665E-07


statistics GD35 1963,1 1984,1
STATISTICS ON SERIES    16      GD35             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               5272.318            VARIANCE                 3781293.
STANDARD DEVIATION        1944.555            STAN. DEV. OF MEAN       414.5804
T-STAT FOR MEAN=0         12.71724            SIGNIFICANCE LEVEL       .3743768E-08


statistics GD36 1963,1 1984,1
STATISTICS ON SERIES    17      GD36             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               2130.409            VARIANCE                 506264.5
STANDARD DEVIATION        711.5227            STAN. DEV. OF MEAN       151.6971
T-STAT FOR MEAN=0         14.04383            SIGNIFICANCE LEVEL       .3722793E-08


statistics GD37 1963,1 1984,1
STATISTICS ON SERIES    18      GD37             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               3821.545            VARIANCE                 1764327.
STANDARD DEVIATION        1328.280            STAN. DEV. OF MEAN       283.1902
T-STAT FOR MEAN=0         13.49463            SIGNIFICANCE LEVEL       .3727106E-08


statistics GD38 1963,1 1984,1
STATISTICS ON SERIES    19      GD38             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               5662.545            VARIANCE                 8543089.
STANDARD DEVIATION        2922.856            STAN. DEV. OF MEAN       623.1551
T-STAT FOR MEAN=0         9.086896            SIGNIFICANCE LEVEL       .1379878E-07


statistics GD39 1963,1 1984,1
STATISTICS ON SERIES    20      GD39             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               1160.727            VARIANCE                 271043.9
STANDARD DEVIATION        520.6188            STAN. DEV. OF MEAN       110.9963
T-STAT FOR MEAN=0         10.45735            SIGNIFICANCE LEVEL       .4599361E-08


statistics GD40 1963,1 1984,1
STATISTICS ON SERIES    21      GD40             22 OBSERVATIONS
FROM   1963:  1  UNTIL  1984:  1

SAMPLE MEAN               93654.18            VARIANCE                 .1314754E+10
[illegible]               [illegible]         STAN. DEV. OF MEAN       [illegible]
```

```
set trend 1963,1 1984,1 = T
ols gd20 63,1 84,1 gd20r
# constant T



DEPENDENT VARIABLE      1       GD20
FROM  1963:   1  UNTIL  1984:   1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .94353174      RBAR**2           .94070833
SSR          23248600.           SEE          1078.1605
DURBIN-WATSON    .40015800
Q(  11)=     28.0464          SIGNIFICANCE LEVEL  .318478E-02
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    4766.558        475.8649        10.01662
  2      TREND      22    0    662.3388        36.23173        18.28063


print(dates) 63,1 84,1 gd20 gd20r


 ENTRY          GD20         1       GD20R     23
 1963:   1       5691.00             262.103
 1964:   1       5824.00            -267.236
 1965:   1       6326.00            -427.575
 1966:   1       7080.00            -335.914
 1967:   1       7286.00            -792.252
 1968:   1       8298.00            -442.591
 1969:   1       9043.00            -359.930
 1970:   1       10099.0             33.7312
 1971:   1       10822.0             94.3924
 1972:   1       11452.0             62.0536
 1973:   1       12379.0             326.715
 1974:   1       12358.0            -356.624
 1975:   1       13486.0             109.037
 1976:   1       14642.0             602.698
 1977:   1       15542.0             840.360
 1978:   1       17862.0             2498.02
 1979:   1       18008.0             1981.68
 1980:   1       17447.0             758.343
 1981:   1       17682.0             331.005
 1982:   1       17283.0            -730.334
 1983:   1       17016.0            -1659.67
 1984:   1       16810.0            -2528.01

end

          NORMAL COMPLETION OF JOB
                 HALT AT      0
                     0 ERRORS          0 WARNINGS
```

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:trend
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 GD20 GD21 GD22 GD23 GD24 GD25 GD26 GD27 GD28 GD29 GD30 $
GD31 GD32 GD33 GD34 GD35 GD36 GD37 GD38 GD39 GD40
set trend 1963,1 1984,1 = T
ols gd20 63,1 84,1 gd20r
# constant T



DEPENDENT VARIABLE     1      GD20
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS            22      DEGREES OF FREEDOM     20
R**2              .94353174     RBAR**2           .94070833
SSR          23248600.          SEE          1078.1605
DURBIN-WATSON    .40015800
Q(  11)=    28.0464       SIGNIFICANCE LEVEL  .318478E-02
NO.      LABEL    VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******   ***  ***   ***********    ***********     ***********
  1      CONSTANT   0    0   4766.558       475.8649        10.01662
  2      TREND     22    0   662.3388       36.23173        18.28063


eval g20 = (sqrt(RSS/22))/12383.45
display g20
   .83013E-01
set trend 1963,1 1984,1 = T
ols gd21 63,1 84,1 gd21r
# constant T



DEPENDENT VARIABLE     2      GD21
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS            22      DEGREES OF FREEDOM     20
R**2              .96519573     RBAR**2           .96345552
SSR          2098786.5          SEE          323.94340
DURBIN-WATSON    .61692721
Q(  11)=    26.7008       SIGNIFICANCE LEVEL  .509801E-02
NO.      LABEL    VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******   ***  ***   ***********    ***********     ***********
  1      CONSTANT   0    0   423.4675       142.9781        2.961766
  2      TREND     22    0   256.3783       10.88616        23.55084



eval g21 = (sqrt(RSS/22))/3371.818
display g21
   .91603E-01
set trend 1963,1 1984,1 = T
ols gd22 63,1 84,1 gd22r
# constant T



DEPENDENT VARIABLE     3      GD22
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS            22      DEGREES OF FREEDOM     20
R**2              .04832846     RBAR**2           .00074489
SSR          1080961.7          SEE          232.48244
DURBIN-WATSON    .70493991
Q(  11)=    43.6938       SIGNIFICANCE LEVEL  .822015E-05
NO.      LABEL    VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******   ***  ***   ***********    ***********     ***********
```

```
eval g22 = (sqrt(RSS/22))/1958.091
display g22
   .11320
set trend 1963,1 1984,1 = T
ols gd23 63,1 84,1 gd23r
# constant T
```

```
DEPENDENT VARIABLE     4      GD23
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2               .83398185      RBAR**2             .82568094
SSR           .15086065E+09      SEE          . 2746.4582
DURBIN-WATSON    .31439267
Q(  11)=    56.3069        SIGNIFICANCE LEVEL  .446274E-07
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    4721.805        1212.197        3.895245
  2      TREND      22    0    925.1118        92.29511        10.02341
```

```
eval g23 = (sqrt(RSS/22))/15360.59
display g23
   .17048
set trend 1963,1 1984,1 = T
ols gd24 63,1 84,1 gd24r
# constant T
```

```
DEPENDENT VARIABLE     5      GD24
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2               .92524589      RBAR**2             .92150819
SSR           11961025.           SEE          773.33774
DURBIN-WATSON    .65355097
Q(  11)=    28.6589        SIGNIFICANCE LEVEL  .256344E-02
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    3982.961        341.3261        11.66908
  2      TREND      22    0    408.8848        25.98812        15.73353
```

```
eval g24 = (sqrt(RSS/22))/8685.136
display g24
   .84898E-01
set trend 1963,1 1984,1 = T
ols gd25 63,1 84,1 gd25r
# constant T
```

```
DEPENDENT VARIABLE     6      GD25
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2               .77829675      RBAR**2             .76721159
SSR           7159549.3           SEE          598.31218
DURBIN-WATSON    .67321250
Q(  11)=    25.6510        SIGNIFICANCE LEVEL  .731179E-02
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    1178.584        264.0755        4.463059
  2      TREND      22    0    168.4749        20.10636        8.379181
```

```
eval g25 = (sqrt(RSS/22))/3116.045
display g25
   .18307
set trend 1963,1 1984,1 = T
ols gd26 63,1 84,1 gd26r
# constant T
```

```
DEPENDENT VARIABLE     7     GD26
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEEDOM     20
R**2             .22503985      RBAR**2             .18629184
SSR          7230506.9          SEE           6011.26978
DURBIN-WATSON    .27314653
Q(  11)=    49.9863        SIGNIFICANCE LEVEL   .629495E-06
NO.      LABEL     VAR  LAG     COEFFICIENT    STTAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    1552.013        2655.3809        5.848247
  2      TREND      22    0    48.69452        20..20576        2.409933
```

```
eval g26 = (sqrt(RSS/22))/2112.0
display g26
   .27144
set trend 1963,1 1984,1 = T
ols gd27 63,1 84,1 gd27r
# constant T
```

```
DEPENDENT VARIABLE     8     GD27
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEEDOM     20
R**2             .91721213      RBAR**2             .91307274
SSR          953455.71          SEE           2188.34098
DURBIN-WATSON  1.19417005
Q(  11)=    46.9067        SIGNIFICANCE LEVEL   .223409E-05
NO.      LABEL     VAR  LAG     COEFFICIENT    STTAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    688.0909        96..36860        7.140199
  2      TREND      22    0    109.2213        7.3337379        14.88561
```

```
eval g27 = (sqrt(RSS/22))/1944.136
display g27
   .10708
set trend 1963,1 1984,1 = T
ols gd28 63,1 84,1 gd28r
# constant T
```

```
DEPENDENT VARIABLE     9     GD28
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEEDOM     20
R**2             .96163750      RBAR**2             .95971937
SSR          1319224.4          SEE           2566.82917
DURBIN-WATSON    .65668325
Q(  11)=    19.0043        SIGNIFICANCE LEVEL   .610165E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STTAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    330.5455        1133.3560        2.915994
  2      TREND      22    0    193.2490        8.6630780        22.39068
```

```
eval g28 = (sqrt(RSS/22))/2552.909
```

```
set trend 1963,1 1984,1 = T
ols gd29 63,1 84,1 gd29r
# constant T



DEPENDENT VARIABLE    10       GD29
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .10005438      RBAR**2           .05505710
SSR          2613366.5            SEE          361.48074
DURBIN-WATSON    .22492940
Q(  11)=    86.4056         SIGNIFICANCE LEVEL  .000000
NO.       LABEL     VAR  LAG     COEFFICIENT   STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************   ************    ************
  1      CONSTANT     0    0    893.6883        159.5458         5.601452
  2      TREND       22    0    18.11406        12.14761         1.491162


eval g29 = (sqrt(RSS/22))/1102.0
display g29
   .31276
set trend 1963,1 1984,1 = T
ols gd30 63,1 84,1 gd30r
# constant T



DEPENDENT VARIABLE    11       GD30
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .88816536      RBAR**2           .88257363
SSR          4979070.6            SEE          498.95243
DURBIN-WATSON    .33198454
Q(  11)=    71.4307         SIGNIFICANCE LEVEL  .000000
NO.       LABEL     VAR  LAG     COEFFICIENT   STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************   ************    ************
  1      CONSTANT     0    0    270.0130        220.2213         1.226098
  2      TREND       22    0    211.3190        16.76737         12.60299


eval g30 = (sqrt(RSS/22))/2700.182
display g30
   .17619
set trend 1963,1 1984,1 = T
ols gd31 63,1 84,1 gd31r
# constant T



DEPENDENT VARIABLE    12       GD31
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .92128945      RBAR**2           .91735393
SSR          9217040.1            SEE          678.86081
DURBIN-WATSON    .48435951
Q(  11)=    55.1108         SIGNIFICANCE LEVEL  .739619E-07
NO.       LABEL     VAR  LAG     COEFFICIENT   STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************   ************    ************
  1      CONSTANT     0    0    1748.468        299.6270         5.835480
  2      TREND       22    0    349.0463        22.81321         15.30018


eval g31 = (sqrt(RSS/22))/5762.5
display g31
   .11232
end
```

```
NORMAL COMPLETION OF JOB
          HALT AT     0
              0 ERRORS          0 WARNINGS
```

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:trend2
cal 1970 1 1
all 0 1984,1
data 1970,1 1984,1 GD20 GD21 GD22 GD23 GD24 GD25 GD26 GD27 GD28 GD29 GD30 $
GD31 GD32 GD33 GD34 GD35 GD36 GD37 GD38 GD39 GD40

statistics GD20 1970,1 1984,1
STATISTICS ON SERIES    1     GD20           15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              1793.133        VARIANCE                41930.84
STANDARD DEVIATION       204.7702        STAN. DEV. OF MEAN      52.87144
T-STAT FOR MEAN=0        33.91497        SIGNIFICANCE LEVEL      .7712099E-14


statistics GD21 1970,1 1984,1
STATISTICS ON SERIES    2     GD21           15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              566.5333        VARIANCE                1341.981
STANDARD DEVIATION       36.63306        STAN. DEV. OF MEAN      9.458615
T-STAT FOR MEAN=0        59.89601        SIGNIFICANCE LEVEL      .0000000


statistics GD22 1970,1 1984,1
STATISTICS ON SERIES    3     GD22           15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              383.8000        VARIANCE                1483.600
STANDARD DEVIATION       38.51753        STAN. DEV. OF MEAN      9.945183
T-STAT FOR MEAN=0        38.59155        SIGNIFICANCE LEVEL      .1141595E-14


statistics GD23 1970,1 1984,1
STATISTICS ON SERIES    4     GD23           15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              1061.200        VARIANCE                106965.6
STANDARD DEVIATION       327.0560        STAN. DEV. OF MEAN      84.44549
T-STAT FOR MEAN=0        12.56669        SIGNIFICANCE LEVEL      .5161506E-08


statistics GD24 1970,1 1984,1
STATISTICS ON SERIES    5     GD24           15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              678.6667        VARIANCE                1835.667
STANDARD DEVIATION       42.84468        STAN. DEV. OF MEAN      11.06245
T-STAT FOR MEAN=0        61.34868        SIGNIFICANCE LEVEL      .1418933E-15


statistics GD25 1970,1 1984,1
STATISTICS ON SERIES    6     GD25           15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              407.0667        VARIANCE                2172.352
STANDARD DEVIATION       46.60850        STAN. DEV. OF MEAN      12.03426
T-STAT FOR MEAN=0        33.82564        SIGNIFICANCE LEVEL      .8146641E-14
```

```
SAMPLE MEAN              287.8667          VARIANCE                  591.9810
STANDARD DEVIATION       24.33066          STAN. DEV. OF MEAN        6.282149
T-STAT FOR MEAN=0        45.82296          SIGNIFICANCE LEVEL        .1784653E-15


statistics GD27 1970,1 1984,1
STATISTICS ON SERIES    8      GD27          15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              866.0667          VARIANCE                  2822.781
STANDARD DEVIATION       53.12985          STAN. DEV. OF MEAN        13.71807
T-STAT FOR MEAN=0        63.13328          SIGNIFICANCE LEVEL        .2736309E-17


statistics GD28 1970,1 1984,1
STATISTICS ON SERIES    9      GD28          15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              1038.733          VARIANCE                  12237.35
STANDARD DEVIATION       110.6226          STAN. DEV. OF MEAN        28.56262
T-STAT FOR MEAN=0        36.36687          SIGNIFICANCE LEVEL        .2841127E-14


statistics GD29 1970,1 1984,1
STATISTICS ON SERIES    10     GD29          15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              91.93333          VARIANCE                  45.63810
STANDARD DEVIATION       6.755597          STAN. DEV. OF MEAN        1.744288
T-STAT FOR MEAN=0        52.70537          SIGNIFICANCE LEVEL        .2606748E-16


statistics GD30 1970,1 1984,1
STATISTICS ON SERIES    11     GD30          15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              728.6000          VARIANCE                  3440.543
STANDARD DEVIATION       58.65614          STAN. DEV. OF MEAN        15.14495
T-STAT FOR MEAN=0        48.10844          SIGNIFICANCE LEVEL        .7977860E-16


statistics GD31 1970,1 1984,1
STATISTICS ON SERIES    12     GD31          15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              1924.000          VARIANCE                  29711.71
STANDARD DEVIATION       172.3709          STAN. DEV. OF MEAN        44.50597
T-STAT FOR MEAN=0        43.23016          SIGNIFICANCE LEVEL        .1068176E-15


statistics GD32 1970,1 1984,1
STATISTICS ON SERIES    13     GD32          15 OBSERVATIONS
FROM  1970:  1  UNTIL  1984:  1

SAMPLE MEAN              469.7333          VARIANCE                  55076.64
STANDARD DEVIATION       234.6841          STAN. DEV. OF MEAN        60.59518
T-STAT FOR MEAN=0        7.751992          SIGNIFICANCE LEVEL        .1972013E-05


statistics GD33 1970,1 1984,1
STATISTICS ON SERIES    14     GD33          15 OBSERVATIONS
```

```
STANDARD DEVIATION        241.8092          STAN. DEV. OF MEAN        62.43487
T-STAT FOR MEAN=0         11.33341          SIGNIFICANCE LEVEL        .1940958E-07


statistics GD34 1970,1 1984,1
STATISTICS ON SERIES    15      GD34              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1

SAMPLE MEAN               1218.933          VARIANCE                  133091.8
STANDARD DEVIATION        364.8175          STAN. DEV. OF MEAN        94.19546
T-STAT FOR MEAN=0         12.94047          SIGNIFICANCE LEVEL        .3530373E-08


statistics GD35 1970,1 1984,1
STATISTICS ON SERIES    16      GD35              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1

SAMPLE MEAN               1326.733          VARIANCE                  12610.92
STANDARD DEVIATION        112.2984          STAN. DEV. OF MEAN        28.99531
T-STAT FOR MEAN=0         45.75682          SIGNIFICANCE LEVEL        .3595214E-16


statistics GD36 1970,1 1984,1
STATISTICS ON SERIES    17      GD36              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1

SAMPLE MEAN               3311.733          VARIANCE                  42170.78
STANDARD DEVIATION        205.3553          STAN. DEV. OF MEAN        53.02250
T-STAT FOR MEAN=0         62.45902          SIGNIFICANCE LEVEL        .0000000


statistics GD37 1970,1 1984,1
STATISTICS ON SERIES    18      GD37              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1

SAMPLE MEAN               2069.600          VARIANCE                  9326.686
STANDARD DEVIATION        96.57477          STAN. DEV. OF MEAN        24.93550
T-STAT FOR MEAN=0         82.99814          SIGNIFICANCE LEVEL        .0000000


statistics GD38 1970,1 1984,1
STATISTICS ON SERIES    19      GD38              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1

SAMPLE MEAN               2578.067          VARIANCE                  61013.92
STANDARD DEVIATION        247.0100          STAN. DEV. OF MEAN        63.77770
T-STAT FOR MEAN=0         40.42270          SIGNIFICANCE LEVEL        .6221599E-15


statistics GD39 1970,1 1984,1
STATISTICS ON SERIES    20      GD39              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1

SAMPLE MEAN               226.6000          VARIANCE                  1484.971
STANDARD DEVIATION        38.53533          STAN. DEV. OF MEAN        9.949779
T-STAT FOR MEAN=0         22.77438          SIGNIFICANCE LEVEL        .1836071E-11


statistics GD40 1970,1 1984,1
STATISTICS ON SERIES    21      GD40              15 OBSERVATIONS
FROM   1970:   1   UNTIL   1984:   1
```

```
end


          NORMAL COMPLETION OF JOB
                    HALT AT      0
                        0 ERRORS          0 WARNINGS
```

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:trend2
cal 1970 1 1
all 0 1984,1
data 1970,1 1984,1 GD20 GD21 GD22 GD23 GD24 GD25 GD26 GD27 GD28 GD29 GD30 $
GD31 GD32 GD33 GD34 GD35 GD36 GD37 GD38 GD39 GD40

set trend 1970,1 1984,1 = T
ols gd20 70,1 84,1 gd20r
# constant T



DEPENDENT VARIABLE     1      GD20
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2             .69276763      RBAR**2            .66913437
SSR          180355.15          SEE          117.78571
DURBIN-WATSON  1.15454305
Q(   7)=    9.19145         SIGNIFICANCE LEVEL  .239202
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0    2362.596       109.4884         21.57849
  2      GD34       15    0   -.4671808       .8628851E-01   -5.414171



eval g20 = (sqrt(RSS/15))/1793.133
display g20
   .61151E-01
set trend 1970,1 1984,1 = T
ols gd21 70,1 84,1 gd21r
# constant T



DEPENDENT VARIABLE     2      GD21
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2             .00840727      RBAR**2           -.06786910
SSR          18629.780          SEE          37.855779
DURBIN-WATSON  1.46364957
Q(   7)=    11.2236         SIGNIFICANCE LEVEL  .129157
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0    555.3104       35.18907         15.78076
  2      GD34       15    0    .9207144E-02   .2773273E-01    .3319957


eval g21 = (sqrt(RSS/15))/566.5333
display g21
   .62206E-01
set trend 1970,1 1984,1 = T
ols gd22 70,1 84,1 gd22r
# constant T



DEPENDENT VARIABLE     3      GD22
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2             .11880512      RBAR**2            .05102090
SSR          18302.770          SEE          37.522065
DURBIN-WATSON   .92792344
Q(   7)=    11.1077         SIGNIFICANCE LEVEL  .133989
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
```

```
  2      GD34       15    0    .3639154E-01    .2748825E-01    1.323894


eval g22 = (sqrt(RSS/15))/383.8
display g22
   .91014E-01
set trend 1970,1 1984,1 = T
ols gd23 70,1 84,1 gd23r
# constant T


DEPENDENT VARIABLE     4      GD23
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS            15      DEGREES OF FREEDOM     13
R**2              .92357903     RBAR**2           .91770050
SSR          114441.80          SEE          93.825452
DURBIN-WATSON  2.15042561
Q(    7)=    2.14297        SIGNIFICANCE LEVEL  .951505
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT    0    0    11.02075        87.21603        .1263615
  2     GD34       15    0    .8615559        .6873549E-01    12.53437


eval g23 = (sqrt(RSS/15))/1061.2
display g23
   .82309E-01
set trend 1970,1 1984,1 = T
ols gd24 70,1 84,1 gd24r
# constant T


DEPENDENT VARIABLE     5      GD24
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS            15      DEGREES OF FREEDOM     13
R**2              .37935658     RBAR**2           .33161478
SSR          15950.122          SEE          35.027596
DURBIN-WATSON  1.39193239
Q(    7)=    19.5605        SIGNIFICANCE LEVEL  .660161E-02
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT    0    0    590.4958        32.56012        18.13555
  2     GD34       15    0    .7233444E-01    .2566083E-01    2.818866


eval g24 = (sqrt(RSS/15))/678.6667
display g24
   .48049E-01
set trend 1970,1 1984,1 = T
ols gd25 70,1 84,1 gd25r
# constant T


DEPENDENT VARIABLE     6      GD25
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS            15      DEGREES OF FREEDOM     13
R**2              .71803846     RBAR**2           .69634911
SSR          8575.2776          SEE          25.683394
DURBIN-WATSON  1.31976457
Q(    7)=    3.44767        SIGNIFICANCE LEVEL  .840737
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT    0    0    275.1064        23.87416        11.52319
  2     GD34       15    0    .1082588        .1881537E-01    5.753745
```

```
eval g25 = (sqrt(RSS/15))/407.0667
display g25
   .58737E-01
set trend 1970,1 1984,1 = T
ols gd26 70,1 84,1 gd26r
# constant T
```

```
DEPENDENT VARIABLE    7      GD26
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS            15      DEGREES OF FREEDOM      13
R**2              .00716002      RBAR**2          -.06921228
SSR          8228.3930           SEE            25.158563
DURBIN-WATSON  1.09743977
Q(    7)=    3.94924         SIGNIFICANCE LEVEL  .785605
NO.     LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***    *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0    294.7455        23.38630         12.60334
  2     GD34       15    0   -.5643331E-02   .1843089E-01    -.3061888
```

```
eval g26 = (sqrt(RSS/15))/287.8667
display g26
   .81362E-01
set trend 1970,1 1984,1 = T
ols gd27 70,1 84,1 gd27r
# constant T
```

```
DEPENDENT VARIABLE    8      GD27
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS            15      DEGREES OF FREEDOM      13
R**2              .58080944      RBAR**2           .54856401
SSR          16565.964           SEE            35.697408
DURBIN-WATSON  1.93713024
Q(    7)=    7.93390         SIGNIFICANCE LEVEL  .338459
NO.     LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***    *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0    730.7785        33.18275         22.02285
  2     GD34       15    0    .1109890       .2615153E-01     4.244072
```

```
eval g27 = (sqrt(RSS/15))/866.0667
display g27
   .38372E-01
set trend 1970,1 1984,1 = T
ols gd28 70,1 84,1 gd28r
# constant T
```

```
DEPENDENT VARIABLE    9      GD28
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS            15      DEGREES OF FREEDOM      13
R**2              .73735035      RBAR**2           .71714653
SSR          44997.909           SEE            58.833474
DURBIN-WATSON   .86677060
Q(    7)=    7.31105         SIGNIFICANCE LEVEL  .397227
NO.     LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***    *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0   1356.117         54.68902         24.79688
  2     GD34       15    0   -.2603785       .4310075E-01    -6.041158
```

```
   .52729E-01
set trend 1970,1 1984,1 = T
ols gd29 70,1 84,1 gd29r
# constant T



DEPENDENT VARIABLE   10      GD29
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS             15      DEGREES OF FREEDOM     13
R**2              .02453838      RBAR**2          -.05049713
SSR          623.25495           SEE          6.9240659
DURBIN-WATSON  2.19637150
Q(    7)=    9.09146        SIGNIFICANCE LEVEL  .246156
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1     CONSTANT    0    0   88.39751        6.436308        13.73419
  2     GD34       15    0   .2900755E-02   .5072494E-02    .5718597


eval g29 = (sqrt(RSS/15))/91.93333
display g29
   .70116E-01
set trend 1970,1 1984,1 = T
ols gd30 70,1 84,1 gd30r
# constant T



DEPENDENT VARIABLE   11      GD30
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS             15      DEGREES OF FREEDOM     13
R**2              .51828778      RBAR**2           .48123300
SSR          23202.921           SEE          42.247368
DURBIN-WATSON  1.85566790
Q(    7)=    3.58707        SIGNIFICANCE LEVEL  .825918
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1     CONSTANT    0    0   869.6923        39.27130        22.14575
  2     GD34       15    0  -.1157506       .3094996E-01   -3.739929


eval g30 = (sqrt(RSS/15))/728.6
display g30
   .53980E-01
set trend 1970,1 1984,1 = T
ols gd31 70,1 84,1 gd31r
# constant T



DEPENDENT VARIABLE   12      GD31
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS             15      DEGREES OF FREEDOM     13
R**2              .24958523      RBAR**2           .19186102
SSR          312145.53           SEE          154.95546
DURBIN-WATSON  1.09879207
Q(    7)=    9.32311        SIGNIFICANCE LEVEL  .230283
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1     CONSTANT    0    0   2211.725        144.0398        15.35496
  2     GD34       15    0  -.2360466       .1135187       -2.079364


eval g31 = (sqrt(RSS/15))/1924.0
display g31
   .74977E-01
```

```
NORMAL COMPLETION OF JOB
          HALT AT     0
              0 ERRORS          0 WARNINGS
```

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:trend2
cal 1970 1 1
all 0 1984,1
data 1970,1 1984,1 GD20 GD21 GD22 GD23 GD24 GD25 GD26 GD27 GD28 GD29 GD30 $
GD31 GD32 GD33 GD34 GD35 GD36 GD37 GD38 GD39 GD40

set trend 1970,1 1984,1 = T
ols gd32 70,1 84,1 gd32r
# constant T



DEPENDENT VARIABLE   13      GD32
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM     13
R**2              .87425383      RBAR**2          .86458105
SSR          96959.465           SEE            86.362147
DURBIN-WATSON  1.77364589
Q(   7)=    3.52445        SIGNIFICANCE LEVEL  .832629
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0    1202.907        80.27847        14.98418
  2      GD34       15    0   -.6014879        .6326795E-01   -9.506991



eval g32 = (sqrt(RSS/15))/469.7333
display g32
   .17116
set trend 1970,1 1984,1 = T
ols gd33 70,1 84,1 gd33r
# constant T



DEPENDENT VARIABLE   14      GD33
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM     13
R**2              .79780401      RBAR**2          .78225048
SSR          165518.36           SEE            112.83697
DURBIN-WATSON  1.28370710
Q(   7)=    3.90444        SIGNIFICANCE LEVEL  .790716
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0   -14.04773        104.8883       -.1339304
  2      GD34       15    0    .5920322        .8266312E-01    7.161987



eval g33 = (sqrt(RSS/15))/707.6
display g33
   .14845
set trend 1970,1 1984,1 = T
ols gd34 70,1 84,1 gd34r
# constant T



DEPENDENT VARIABLE   15      GD34
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM     13
R**2             1.00000000      RBAR**2         1.00000000
SSR          .11346684E-22       SEE            .93424937E-12
DURBIN-WATSON   .00181294
Q(   7)=   84.5536         SIGNIFICANCE LEVEL  .000000
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
```

```
  2      GD34        15    0    1.000000        .6844208E-15    .1461090E+16


eval g34 = (sqrt(RSS/15))/1218.933
display g34
   .71352E-15
set trend 1970,1 1984,1 = T
ols gd35 70,1 84,1 gd35r
# constant T


DEPENDENT VARIABLE    16      GD35
FROM  1970:  1  UNTIL  1984:   1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .68261615      RBAR**2            .65820201
SSR          56035.049           SEE           65.653548
DURBIN-WATSON  1.37044732
Q(    7)=     13.6493         SIGNIFICANCE LEVEL  .577821E-01
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************    ************    ************
  1     CONSTANT     0    0    1016.730        61.02866        16.65988
  2     GD34        15    0    .2543233        .4809706E-01    5.287709


eval g35 = (sqrt(RSS/15))/1326.733
display g35
   .46068E-01
set trend 1970,1 1984,1 = T
ols gd36 70,1 84,1 gd36r
# constant T


DEPENDENT VARIABLE    17      GD36
FROM  1970:  1  UNTIL  1984:   1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .24352762      RBAR**2            .18533743
SSR          446614.44           SEE           185.35090
DURBIN-WATSON  1.59253919
Q(    7)=     11.6094         SIGNIFICANCE LEVEL  .114158
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************    ************    ************
  1     CONSTANT     0    0    3650.331        172.2941        21.18663
  2     GD34        15    0   -.2777821        .1357860       -2.045734


eval g36 = (sqrt(RSS/15))/3311.733
display g36
   .52103E-01
set trend 1970,1 1984,1 = T
ols gd37 70,1 84,1 gd37r
# constant T


DEPENDENT VARIABLE    18      GD37
FROM  1970:  1  UNTIL  1984:   1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .36265239      RBAR**2            .31362565
SSR          83220.772           SEE           80.009986
DURBIN-WATSON  1.70642877
Q(    7)=     10.3488         SIGNIFICANCE LEVEL  .169656
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************    ************    ************
  1     CONSTANT     0    0    2263.918        74.37378        30.43973
  2     GD34        15    0   -.1594165        .5861443E-01   -2.719749
```

```
eval g37 = (sqrt(RSS/15))/2069.6
display g37
   .35990E-01
set trend 1970,1 1984,1 = T
ols gd38 70,1 84,1 gd38r
# constant T



DEPENDENT VARIABLE   19      GD38
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2             .54894722        RBAR**2          .51425085
SSR           385287.00           SEE          172.15534
DURBIN-WATSON  1.02535916
Q(    7)=    9.24812        SIGNIFICANCE LEVEL  .235330
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0    1966.584        160.0281        12.28899
  2      GD34       15    0    .5016539        .1261191        3.977620


eval g38 = (sqrt(RSS/15))/2578.067
display g38
   .62166E-01
set trend 1970,1 1984,1 = T
ols gd39 70,1 84,1 gd39r
# constant T



DEPENDENT VARIABLE   20      GD39
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2             .55132847        RBAR**2          .51681528
SSR            9327.7016          SEE          26.786480
DURBIN-WATSON  1.59965694
Q(    7)=    4.17563        SIGNIFICANCE LEVEL  .759341
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0    130.9976        24.89954        5.261047
  2      GD34       15    0    .7843116E-01   .1962348E-01    3.996802


eval g39 = (sqrt(RSS/15))/226.6
display g39
   .11005
set trend 1970,1 1984,1 = T
ols gd40 70,1 84,1 gd40r
# constant T



DEPENDENT VARIABLE   21      GD40
FROM  1970:  1  UNTIL  1984:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2             .35865823        RBAR**2          .30932425
SSR           7543463.5           SEE          761.75220
DURBIN-WATSON  1.48531347
Q(    7)=    10.3333        SIGNIFICANCE LEVEL  .170457
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0    19902.71        708.0915        28.10754
  2      GD34       15    0    1.504670        .5580512        2.696294
```

```
   .32625E-01
end

          NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS          0 WARNINGS
```

```
open data b:stab
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 EGR63 EAN63 UGR70 UAN70 EST ECV ERA EAD EI3 UST UCV $
URA UAD UI3

cmoment(print,corr) 63,1 63,21
# EGR63 EST

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    1      EGR63
VAR    5      EST

CORRELATION MATRIX
    VARIABLE             EGR63          EST
          SERIES LAG      1    0         5    0
    EGR63        1    0   1.0000        .40733
    EST          5    0   .40733        1.0000


cmoment(print,corr) 63,1 63,21
# EAN63 EST

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    2      EAN63
VAR    5      EST

CORRELATION MATRIX
    VARIABLE             EAN63          EST
          SERIES LAG      2    0         5    0
    EAN63        2    0   1.0000        .68542
    EST          5    0   .68542        1.0000


cmoment(print,corr) 63,1 63,21
# EGR63 ECV

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    1      EGR63
VAR    6      ECV

CORRELATION MATRIX
    VARIABLE             EGR63          ECV
          SERIES LAG      1    0         6    0
    EGR63        1    0   1.0000       -.35722
    ECV          6    0  -.35722        1.0000


cmoment(print,corr) 63,1 63,21
# EAN63 ECV

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    2      EAN63
VAR    6      ECV

CORRELATION MATRIX
    VARIABLE             EAN63          ECV
          SERIES LAG      2    0         6    0
    EAN63        2    0   1.0000       -.40355
    ECV          6    0  -.40355        1.0000
```

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```
# EGR63 ERA

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR     1       EGR63
VAR     7       ERA

CORRELATION MATRIX
    VARIABLE               EGR63          ERA
          SERIES LAG       1    0          7    0
    EGR63        1    0    1.0000         .34182
    ERA          7    0    .34182         1.0000


cmoment(print,corr) 63,1 63,21
# EAN63 ERA

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR     2       EAN63
VAR     7       ERA

CORRELATION MATRIX
    VARIABLE               EAN63          ERA
          SERIES LAG       2    0          7    0
    EAN63        2    0    1.0000         .64963
    ERA          7    0    .64963         1.0000


cmoment(print,corr) 63,1 63,21
# EGR63 EAD

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR     1       EGR63
VAR     8       EAD

CORRELATION MATRIX
    VARIABLE               EGR63          EAD
          SERIES LAG       1    0          8    0
    EGR63        1    0    1.0000         .50468
    EAD          8    0    .50468         1.0000


cmoment(print,corr) 63,1 63,21
# EAN63 EAD

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR     2       EAN63
VAR     8       EAD

CORRELATION MATRIX
    VARIABLE               EAN63          EAD
          SERIES LAG       2    0          8    0
    EAN63        2    0    1.0000         .69420
    EAD          8    0    .69420         1.0000


cmoment(print,corr) 63,1 63,21
# EGR63 EI3

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR     1       EGR63
VAR     9       EI3
```

```
    VARIABLE                EGR63          EI3
          SERIES LAG         1    0        9    0
    EGR63          1    0   1.0000         .25853E-01
    EI3            9    0   .25853E-01     1.0000



cmoment(print,corr) 63,1 63,21
# EAN63 EI3

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     2      EAN63
VAR     9      EI3

CORRELATION MATRIX
    VARIABLE                EAN63          EI3
          SERIES LAG         2    0        9    0
    EAN63          2    0   1.0000         .48199E-01
    EI3            9    0   .48199E-01     1.0000



cmoment(print,corr) 63,1 63,21
# UGR70 UST

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     3      UGR70
VAR    10      UST

CORRELATION MATRIX
    VARIABLE                UGR70          UST
          SERIES LAG         3    0        10    0
    UGR70          3    0   1.0000         .60762
    UST           10    0   .60762         1.0000



cmoment(print,corr) 63,1 63,21
# UAN70 UST

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     4      UAN70
VAR    10      UST

CORRELATION MATRIX
    VARIABLE                UAN70          UST
          SERIES LAG         4    0        10    0
    UAN70          4    0   1.0000         .57034
    UST           10    0   .57034         1.0000



cmoment(print,corr) 63,1 63,21
# UGR70 UCV

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     3      UGR70
VAR    11      UCV

CORRELATION MATRIX
    VARIABLE                UGR70          UCV
          SERIES LAG         3    0        11    0
    UGR70          3    0   1.0000         .62493E-01
    UCV           11    0   .62493E-01     1.0000
```

```
cmoment(print,corr) 63,1 63,21
# UAN70 UCV

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    4      UAN70
VAR   11      UCV

CORRELATION MATRIX
    VARIABLE              UAN70          UCV
          SERIES LAG       4    0        11    0
    UAN70        4    0    1.0000        .68344E-01
    UCV         11    0    .68344E-01    1.0000


cmoment(print,corr) 63,1 63,21
# UGR70 URA

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    3      UGR70
VAR   12      URA

CORRELATION MATRIX
    VARIABLE              UGR70          URA
          SERIES LAG       3    0        12    0
    UGR70        3    0    1.0000        .47994
    URA         12    0    .47994        1.0000


cmoment(print,corr) 63,1 63,21
# UAN70 URA

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    4      UAN70
VAR   12      URA

CORRELATION MATRIX
    VARIABLE              UAN70          URA
          SERIES LAG       4    0        12    0
    UAN70        4    0    1.0000        .45023
    URA         12    0    .45023        1.0000


cmoment(print,corr) 63,1 63,21
# UGR70 UAD

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    3      UGR70
VAR   13      UAD

CORRELATION MATRIX
    VARIABLE              UGR70          UAD
          SERIES LAG       3    0        13    0
    UGR70        3    0    1.0000        .70893
    UAD         13    0    .70893        1.0000


cmoment(print,corr) 63,1 63,21
# UAN70 UAD

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    4      UAN70
```

```
CORRELATION MATRIX
    VARIABLE                UAN70          UAD
          SERIES LAG         4    0        13    0
    UAN70        4    0     1.0000         .65319
    UAD         13    0     .65319         1.0000


cmoment(print,corr) 63,1 63,21
# UGR70 UI3

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    3      UGR70
VAR   14      UI3

CORRELATION MATRIX
    VARIABLE                UGR70          UI3
          SERIES LAG         3    0        14    0
    UGR70        3    0     1.0000         .50635
    UI3         14    0     .50635         1.0000


cmoment(print,corr) 63,1 63,21
# UAN70 UI3

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    4      UAN70
VAR   14      UI3

CORRELATION MATRIX
    VARIABLE                UAN70          UI3
          SERIES LAG         4    0        14    0
    UAN70        4    0     1.0000         .51904
    UI3         14    0     .51904         1.0000


end

         NORMAL COMPLETION OF JOB
                  HALT AT     0
                      0 ERRORS         0 WARNINGS
```

APPENDIX FIVE
STATISTICAL APPENDIX FOR CHAPTER FOUR

```
open data b:data1.bak
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 ST63 ST64 ST65 ST66 ST67 ST68 ST69 ST70 ST71 ST72 ST73 $
ST74 ST75 ST76 ST77 ST78 ST79 ST80 ST81 ST82 ST83 ST84

set SG63 1963,1 1963,21 = (ST63(t)/34908)*100
set SG64 1963,1 1963,21 = (ST64(t)/44224)*100
set SG65 1963,1 1963,21 = (ST65(t)/58319)*100
set SG66 1963,1 1963,21 = (ST66(t)/64731)*100
set SG67 1963,1 1963,21 = (ST67(t)/71369)*100
set SG68 1963,1 1963,21 = (ST68(t)/80376)*100
set SG69 1963,1 1963,21 = (ST69(t)/87368)*100
set SG70 1963,1 1963,21 = (ST70(t)/101212)*100
set SG71 1963,1 1963,21 = (ST71(t)/119979)*100
set SG72 1963,1 1963,21 = (ST72(t)/144641)*100
set SG73 1963,1 1963,21 = (ST73(t)/149193)*100
set SG74 1963,1 1963,21 = (ST74(t)/159234)*100
set SG75 1963,1 1963,21 = (ST75(t)/178563)*100
set SG76 1963,1 1963,21 = (ST76(t)/205816)*100
set SG77 1963,1 1963,21 = (ST77(t)/214993)*100
set SG78 1963,1 1963,21 = (ST78(t)/232334)*100
set SG79 1963,1 1963,21 = (ST79(t)/222697)*100
set SG80 1963,1 1963,21 = (ST80(t)/220171)*100
set SG81 1963,1 1963,21 = (ST81(t)/226394)*100
set SG82 1963,1 1963,21 = (ST82(t)/274966)*100
set SG83 1963,1 1963,21 = (ST83(t)/263227)*100
set SG84 1963,1 1963,21 = (ST84(t)/246482)*100
print 1963,1 1963,21 SG63 SG64 SG65 SG66 SG67 SG68 SG69 SG70 SG71 SG72 SG73 $
SG74 SG75 SG76 SG77 SG78 SG79 SG80 SG81 SG82 SG83 SG84
```

ENTRY	SG63 23	SG64 24	SG65 25	SG66 26
1	15.5953	12.7804	10.0585	9.37727
2	5.16214	4.39806	3.74492	3.96564
3	1.62713	1.44266	1.23287	1.32085
4	17.2081	16.0004	13.2890	12.5380
5	.418242	.531386	.253777	.261080
6	.438295	.766552	.723606	.899106
7	.263550	.203509	.250347	.256446
8	5.15641	5.04929	4.39651	4.43991
9	.406784	.951972	.852209	.803325
10	.644551	.594700	.509268	.474270
11	2.30893	2.11650	1.79358	1.91562
12	17.5576	17.5787	23.4726	23.4107
13	.423972	1.53310	3.35225	3.03873
14	11.2725	10.5463	9.20798	9.30466
15	8.89194	13.5831	16.7733	17.1170
16	3.99335	3.83954	3.49629	4.10468
17	.684657	.639924	.509268	.840401
18	2.31466	2.22956	1.95648	2.10873
19	5.35980	4.93849	3.88896	3.60260
20	.272144	.275868	.238344	.220914
21	100.000	100.000	100.000	100.000

ENTRY	SG67 27	SG68 28	SG69 29	SG70 30
1	8.96888	8.72400	9.38101	9.73205
2	4.17128	3.94148	3.57110	3.79105
3	1.46702	1.56141	1.59898	1.50081
4	12.0248	11.8232	11.9620	11.8652
5	.290042	.406838	.502472	.505869
6	.933178	1.01025	1.11025	1.14809
7	.246606	.288643	.439520	.397186

11	2.08634	2.52065	2.86375	2.88701
12	20.3926	18.7295	16.3263	15.3539
13	3.30956	2.88519	3.98544	3.26542
14	9.35840	10.7520	10.5668	10.6282
15	18.2292	18.3836	18.4495	19.5836
16	5.47857	5.43197	4.91713	5.05671
17	.900951	.894546	.874462	.996917
18	2.09615	2.30293	2.64284	2.92159
19	3.60661	3.87056	4.30364	4.37399
20	.208774	.192844	.258676	.237126
21	100.000	100.000	100.000	100.000

ENTRY	SG71 31	SG72 32	SG73 33	SG74 34
1	9.34580	9.37079	9.51318	9.02445
2	3.64981	3.62760	3.64226	3.78248
3	1.25855	1.07162	.971895	.846553
4	12.3763	12.8380	13.3063	14.0027
5	.533427	.691367	.783549	.854717
6	1.38441	1.50511	1.62608	1.75779
7	.442577	.406524	.463158	.440233
8	4.26491	4.38603	3.98544	3.78688
9	.971003	1.07369	1.06640	1.01235
10	.305887	.282078	.262747	.221686
11	2.95885	2.98809	2.91234	2.61690
12	14.2683	13.4492	12.6273	12.2342
13	4.30825	6.05084	7.18197	7.79482
14	11.7862	11.9807	12.2955	12.3140
15	18.5316	16.1102	14.6207	12.0985
16	4.39827	4.54919	4.77100	6.12746
17	1.02851	1.12001	1.10930	.947662
18	2.95385	3.11461	3.08929	3.92065
19	4.97254	5.08915	5.50763	5.92713
20	.260879	.295214	.264087	.288883
21	100.000	100.000	100.000	100.000

ENTRY	SG75 35	SG76 36	SG77 37	SG78 38
1	9.31548	9.31560	9.88358	10.3459
2	3.70794	4.25526	3.62105	3.64389
3	.859641	.963968	.926542	.893111
4	15.2316	16.1965	16.5298	15.8573
5	.948685	1.09224	1.30562	1.34160
6	1.61344	1.70638	1.70610	1.55208
7	.397619	.592762	.578158	.556526
8	4.05739	4.32960	4.34851	4.49052
9	.950925	1.00478	1.00422	.999423
10	.201049	.242450	.264660	.287948
11	2.69149	2.88219	3.06754	3.15881
12	11.4901	11.1065	10.4482	9.77816
13	7.12802	5.16821	4.57829	4.37990
14	12.5132	13.3415	13.2762	13.1591
15	11.2313	10.1610	9.94591	9.36540
16	6.16365	5.93783	5.94996	6.45106
17	.949805	1.07377	1.25167	1.22668
18	4.02995	4.21201	4.01920	4.10487
19	6.20453	6.03354	6.83883	7.88219
20	.314175	.383838	.455829	.525537
21	100.000	100.000	100.000	100.000

ENTRY	SG79 39	SG80 40	SG81 41	SG82 42
1	10.4793	10.0127	9.73259	9.78630
2	3.89588	4.69045	5.07081	5.21083
3	.892244	.972880	.913893	1.00267
4	16.0056	14.8639	14.1700	12.8292
5	1.42570	1.40209	1.46868	1.55001
6	1.84062	1.91215	1.80747	1.74603
7	.516397	.453738	.443033	.537521
8	[illegible]	[illegible]	[illegible]	[illegible]

11	3.13924	3.00176	2.90820	2.98510
12	9.54301	8.97757	8.69281	9.60810
13	4.86536	4.73178	4.61850	3.93176
14	11.8250	13.5931	13.9001	14.2199
15	9.08274	9.23737	9.72287	10.3107
16	7.02165	6.86421	8.21312	7.66640
17	1.24923	1.07644	1.01946	1.10123
18	3.82493	3.58222	2.87375	2.92000
19	7.91434	8.44071	8.73080	9.15822
20	.509661	.505970	.506639	.460057
21	100.000	100.000	100.000	100.000

ENTRY	SG83 43	SG84 44
1	9.74178	9.79341
2	5.01582	3.99948
3	.958488	.910006
4	11.7283	10.8604
5	1.49491	1.43702
6	1.59254	1.46786
7	.496150	.464943
8	3.00767	3.43554
9	1.19821	1.24228
10	.322535	.290488
11	2.96854	3.00225
12	9.77521	10.0320
13	4.41482	4.87378
14	14.1156	13.7268
15	11.5288	12.1348
16	7.43731	7.44273
17	.936834	.862538
18	2.72920	2.58721
19	10.0571	10.9582
20	.480194	.478331
21	100.000	100.000

```
open data b:data2
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 ST63 ST64 ST65 ST66 ST67 ST68 ST69 ST70 ST71 ST72 ST73 $
ST74 ST75 ST76 ST77 ST78 ST79 ST80 ST81 ST82 ST83 ST84

set SG63 1963,1 1963,21 = (ST63(t)/51080)*100
set SG64 1963,1 1963,21 = (ST64(t)/54620)*100
set SG65 1963,1 1963,21 = (ST65(t)/55971)*100
set SG66 1963,1 1963,21 = (ST66(t)/56533)*100
set SG67 1963,1 1963,21 = (ST67(t)/59412)*100
set SG68 1963,1 1963,21 = (ST68(t)/60870)*100
set SG69 1963,1 1963,21 = (ST69(t)/64305)*100
set SG70 1963,1 1963,21 = (ST70(t)/70024)*100
set SG71 1963,1 1963,21 = (ST71(t)/70495)*100
set SG72 1963,1 1963,21 = (ST72(t)/75157)*100
set SG73 1963,1 1963,21 = (ST73(t)/78102)*100
set SG74 1963,1 1963,21 = (ST74(t)/80962)*100
set SG75 1963,1 1963,21 = (ST75(t)/78748)*100
set SG76 1963,1 1963,21 = (ST76(t)/81217)*100
set SG77 1963,1 1963,21 = (ST77(t)/83400)*100
set SG78 1963,1 1963,21 = (ST78(t)/85306)*100
set SG79 1963,1 1963,21 = (ST79(t)/87870)*100
set SG80 1963,1 1963,21 = (ST80(t)/84678)*100
set SG81 1963,1 1963,21 = (ST81(t)/82119)*100
set SG82 1963,1 1963,21 = (ST82(t)/83380)*100
set SG83 1963,1 1963,21 = (ST83(t)/83688)*100
set SG84 1963,1 1963,21 = (ST84(t)/84815)*100
print 1963,1 1963,21 SG63 SG64 SG65 SG66 SG67 SG68 SG69 SG70 SG71 SG72 SG73 $
SG74 SG75 SG76 SG77 SG78 SG79 SG80 SG81 SG82 SG83 SG84
```

ENTRY	SG63 23	SG64 24	SG65 25	SG66 26
1	7.94049	7.99524	7.95591	7.92811
2	2.61355	2.66203	2.76036	2.83374
3	.415035	.439399	.450233	.463446
4	7.50979	7.35811	7.22338	7.08613
5	1.88919	1.85829	1.82237	1.80072
6	.225137	.205053	.187597	.176888
7	1.23923	1.27243	1.30425	1.30543
8	3.36922	3.38521	3.39462	3.36441
9	3.59828	3.60674	3.61795	3.58905
10	.422866	.406445	.387701	.369696
11	1.64448	1.77957	2.07965	2.38445
12	13.5395	13.6177	13.8858	14.3368
13	1.81284	1.69718	1.58475	2.18633
14	3.02662	3.23142	3.50717	3.05485
15	12.5626	12.4094	12.1652	11.8232
16	6.08066	6.02710	5.94951	5.86560
17	10.4150	10.4980	10.4858	10.4435
18	5.87314	5.87514	5.81372	5.84614
19	14.5713	14.4489	14.1984	13.9052
20	1.25098	1.22666	1.22563	1.23645
21	100.000	100.000	100.000	100.000

ENTRY	SG67 27	SG68 28	SG69 29	SG70 30
1	7.98155	7.98259	7.93562	7.89158
2	2.91524	2.95219	2.90180	2.93185
3	.476335	.507639	.573828	.609791
4	6.91948	6.85067	6.79729	6.65486
5	1.77910	1.74963	1.70282	1.63373
6	.164950	.174142	.194386	.224209
7	1.31455	1.32249	1.30316	1.27671
8	3.34613	3.35305	3.49895	3.77156
9	3.56999	3.55840	3.35899	3.02182
10	.355147	.351569	.349895	.357020
11	[illegible]	[illegible]	[illegible]	[illegible]

14	2.21504	2.65484	2.85048	2.91186
15	11.5717	11.3833	11.2542	11.2961
16	5.82542	5.79103	5.72895	5.67805
17	10.4777	10.4961	10.4844	10.4021
18	5.91800	5.96024	5.92022	5.90797
19	13.7211	13.5255	13.1638	12.9184
20	1.20683	1.20421	1.22541	1.20530
21	100.000	100.000	100.000	100.000

ENTRY	SG71 31	SG72 32	SG73 33	SG74 34
1	7.95943	8.08574	8.20978	8.28290
2	3.08249	3.30508	3.54920	3.83143
3	.652529	.643985	.612020	.478002
4	6.53805	6.43852	6.26616	6.09175
5	1.58877	1.66585	1.69906	1.65263
6	.208525	.159666	.165169	.192683
7	1.32350	1.46227	1.55822	1.56370
8	3.47259	3.22392	3.01145	3.39295
9	3.27257	3.56454	3.76943	3.33860
10	.388680	.353926	.370029	.373015
11	3.49670	3.54192	3.48263	3.44730
12	15.3429	15.0631	15.0214	15.4690
13	3.22576	2.99639	1.51341	1.33766
14	2.40443	2.74359	4.19836	4.33290
15	11.4051	11.4653	11.4466	11.6450
16	5.60749	5.55903	5.53123	5.46306
17	10.1950	10.1853	10.1598	10.0096
18	5.95645	6.03936	6.20087	6.21279
19	12.6789	12.2850	12.0074	11.6796
20	1.20009	1.21745	1.22788	1.20550
21	100.000	100.000	100.000	100.000

ENTRY	SG75 35	SG76 36	SG77 37	SG78 38
1	8.18814	8.10668	8.17626	8.28664
2	3.71057	3.59161	3.68225	3.85084
3	.584142	.658729	.610312	.515790
4	6.12968	6.19698	6.08393	5.94331
5	1.58988	1.52677	1.54436	1.56144
6	.191751	.174840	.195444	.215694
7	1.54798	1.56002	1.55516	1.56261
8	3.26357	3.13235	3.17626	3.24479
9	3.42358	3.50419	3.48201	3.44524
10	.379692	.406319	.348921	.322369
11	3.51755	3.62363	3.69065	3.69259
12	15.7985	15.7947	15.7602	15.7750
13	2.10037	2.09931	1.66187	2.13936
14	3.54549	3.62116	4.04676	3.49096
15	11.9520	12.2351	12.3417	12.2078
16	5.41982	5.37695	5.33933	5.33843
17	10.0155	9.92772	10.0731	10.1447
18	6.11444	6.17482	6.09233	6.16252
19	11.3425	11.1097	10.9748	10.9418
20	1.18479	1.17832	1.16427	1.15818
21	100.000	100.000	100.000	100.000

ENTRY	SG79 39	SG80 40	SG81 41	SG82 42
1	8.41698	8.50162	8.58876	8.69873
2	3.81700	3.86877	3.87365	3.69393
3	.631615	.650700	.709945	.923483
4	5.77672	5.61421	5.49812	5.34181
5	1.61602	1.67104	1.65857	1.62629
6	.187777	.243275	.239896	.209882
7	1.64106	1.61553	1.60012	1.59870
8	3.36406	3.24878	3.00905	3.14464
9	3.32423	3.47788	3.81398	3.78148
10	.286787	.220837	.171702	.137923
11	[illegible]	[illegible]	[illegible]	[illegible]

14	3.36634	2.90394	2.19316	3.01871
15	11.9939	11.8035	11.6282	11.4680
16	5.36247	5.35086	5.30937	5.26865
17	10.2970	10.5600	10.5043	10.6189
18	6.10220	5.92007	6.04367	6.00024
19	11.0504	11.1056	11.0571	11.0194
20	1.15625	1.14788	1.12763	1.10938
21	100.000	100.000	100.000	100.000

ENTRY	SG83 43	SG84 44
1	8.74080	8.81212
2	3.67795	3.75405
3	.936813	.846548
4	5.19429	5.05689
5	1.58804	1.54925
6	.188796	.194541
7	1.60358	1.59406
8	3.03150	2.86270
9	4.01850	4.29287
10	.126661	.137947
11	3.68990	3.69628
12	16.1206	16.0396
13	2.03135	2.02323
14	3.59550	3.58191
15	11.3170	11.0747
16	5.25045	5.25615
17	10.6037	10.7835
18	6.17651	6.26658
19	11.0183	11.1101
20	1.08976	1.06703
21	100.000	100.000

open output con

```
open data b:lab1
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 ST63 ST64 ST65 ST66 ST67 ST68 ST69 ST70 ST71 ST72 ST73 $
ST74 ST75 ST76 ST77 ST78 ST79 ST80 ST81 ST82 ST83 ST84

set SG63 1963,1 1963,21 = (ST63(t)/466196)*100
set SG64 1963,1 1963,21 = (ST64(t)/489262)*100
set SG65 1963,1 1963,21 = (ST65(t)/492367)*100
set SG66 1963,1 1963,21 = (ST66(t)/495853)*100
set SG67 1963,1 1963,21 = (ST67(t)/496300)*100
set SG68 1963,1 1963,21 = (ST68(t)/485514)*100
set SG69 1963,1 1963,21 = (ST69(t)/492331)*100
set SG70 1963,1 1963,21 = (ST70(t)/513240)*100
set SG71 1963,1 1963,21 = (ST71(t)/274060)*100
set SG72 1963,1 1963,21 = (ST72(t)/288056)*100
set SG73 1963,1 1963,21 = (ST73(t)/604042)*100
set SG74 1963,1 1963,21 = (ST74(t)/588561)*100
set SG75 1963,1 1963,21 = (ST75(t)/603788)*100
set SG76 1963,1 1963,21 = (ST76(t)/367977)*100
set SG77 1963,1 1963,21 = (ST77(t)/374062)*100
set SG78 1963,1 1963,21 = (ST78(t)/671497)*100
set SG79 1963,1 1963,21 = (ST79(t)/381027)*100
set SG80 1963,1 1963,21 = (ST80(t)/658042)*100
set SG81 1963,1 1963,21 = (ST81(t)/664322)*100
set SG82 1963,1 1963,21 = (ST82(t)/361516)*100
set SG83 1963,1 1963,21 = (ST83(t)/395033)*100
set SG84 1963,1 1963,21 = (ST84(t)/698651)*100
print 1963,1 1963,21 SG63 SG64 SG65 SG66 SG67 SG68 SG69 SG70 SG71 SG72 SG73 $
SG74 SG75 SG76 SG77 SG78 SG79 SG80 SG81 SG82 SG83 SG84
```

ENTRY	SG63 89	SG64 90	SG65 91	SG66 92
1	17.7666	17.7956	17.2030	17.5752
2	2.48200	2.54608	2.37770	2.55237
3	3.28939	3.00330	3.13283	2.95128
4	11.9604	11.7129	11.7559	11.8864
5	15.0173	16.1280	15.2992	14.6035
6	5.53952	5.48684	5.55175	5.24248
7	4.27524	4.11150	4.18265	4.42571
8	1.36531	1.34590	1.51980	1.61600
9	2.87175	2.75742	2.75567	2.76050
10	2.02683	1.96827	1.88924	1.88221
11	1.69156	1.70604	1.80130	1.89330
12	2.68342	2.66994	3.09261	3.13924
13	.316820	.265502	.310541	.322475
14	6.96939	6.91470	7.05734	7.06984
15	.631923	.550830	.676325	.915997
16	8.30788	8.22749	8.14311	7.96103
17	2.74734	2.76886	2.91754	3.00129
18	2.72589	3.01107	3.12572	3.07168
19	5.56526	5.36829	5.47600	5.38143
20	1.76621	1.66148	1.73184	1.74810
21	100.000	100.000	100.000	100.000

ENTRY	SG67 93	SG68 94	SG69 95	SG70 96
1	17.4747	17.0407	16.8661	16.1827
2	2.71529	2.78839	2.78410	2.72894
3	2.53718	2.35029	2.03258	1.98893
4	11.6236	11.3863	11.2353	10.9875
5	15.7497	14.6418	14.3284	13.3565
6	5.05037	5.26617	5.19549	5.92179
7	4.43784	4.59513	4.68283	4.54855
8	1.60488	1.69635	1.60664	1.53184
9	2.69212	2.87613	2.79365	2.67497
10	1.85916	1.82137	1.70069	1.89346
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

14	6.91940	6.95799	6.94919	6.69141
15	.936933	1.02510	1.19249	1.29179
16	7.84082	7.95096	8.26761	7.99197
17	2.93210	3.02690	3.03434	3.31930
18	3.15454	3.69752	3.79826	4.03262
19	5.27806	5.29583	5.73578	6.86579
20	1.71046	1.82817	1.73420	1.89521
21	100.000	100.000	100.000	100.000

ENTRY	SG71 97	SG72 98	SG73 99	SG74 100
1	14.1221	13.5571	14.7813	16.0452
2	2.75414	2.78453	2.03744	2.17157
3	3.49340	3.00497	1.49807	1.51675
4	17.2776	17.4595	11.3269	11.8878
5	6.66095	7.00905	11.9247	11.6115
6	2.82529	2.96123	5.69596	5.23293
7	2.15646	2.13361	4.87466	4.18071
8	2.50529	2.40856	1.31961	1.41226
9	3.15953	3.01677	2.64270	2.62760
10	1.42414	1.19005	2.16227	1.78588
11	3.31789	3.46460	2.62101	2.64136
12	5.36525	5.64335	3.35324	3.64108
13	.739984	.811301	.623301	.673167
14	7.35313	7.06009	6.20238	6.47851
15	2.58666	2.63386	1.30107	1.51879
16	6.35846	6.52859	7.92163	8.41000
17	3.39451	3.28617	3.92307	3.45860
18	5.88776	6.18664	5.04485	4.80222
19	7.56221	7.77835	8.74244	8.01174
20	1.05524	1.08173	2.00350	1.89224
21	100.000	100.000	100.000	100.000

ENTRY	SG75 143	SG76 101	SG77 102	SG78 103
1	16.5171	13.0630	12.8273	14.0468
2	2.18653	2.71484	2.64956	1.89457
3	1.36869	2.32678	2.60839	1.45511
4	12.2646	17.8579	17.4867	11.6720
5	11.5792	10.1357	10.2823	12.9984
6	5.13293	2.49119	2.54156	4.91573
7	4.57098	2.11861	2.08228	4.65572
8	1.42683	2.17731	2.14376	1.64156
9	2.50386	2.50233	2.56909	2.57410
10	1.78159	1.09192	1.20809	2.31542
11	2.73076	3.87035	3.98704	2.90098
12	3.54214	5.65117	5.69638	3.87329
13	.658178	.937830	.963477	.706630
14	6.17386	6.29469	6.30831	5.88491
15	1.58284	2.62054	2.67576	1.46181
16	8.45396	6.55095	6.65932	8.08894
17	3.42554	3.07791	3.12061	3.32436
18	4.24520	5.24218	5.17829	4.52735
19	7.90774	8.15241	7.85164	9.38262
20	1.94754	1.12235	1.16024	1.67968
21	100.000	100.000	100.000	100.000

ENTRY	SG79 104	SG80 105	SG81 106	SG82 107
1	12.6519	14.9720	10.1041	13.3629
2	2.65677	2.32873	1.59275	2.45134
3	3.71260	1.28989	1.24413	3.43415
4	16.5028	11.6766	9.06744	15.9362
5	10.2730	12.1707	17.5036	9.58381
6	2.09696	4.88449	5.27771	1.98968
7	1.74896	4.73602	5.52323	1.49980
8	2.01009	1.45553	1.39149	1.89480
9	2.48932	2.63767	3.07486	2.31193
10	.947439	2.18360	2.30671	.863862

14	5.80694	5.86528	4.93450	5.37321
15	2.25811	1.66418	1.80485	2.12273
16	6.39456	8.11666	7.17905	6.37123
17	3.08876	2.93416	2.92328	2.67872
18	4.38499	4.36659	4.42391	4.50298
19	11.4197	9.45456	11.9501	13.1184
20	.922507	1.65521	2.23988	.617123
21	100.000	100.000	100.000	100.000

ENTRY	SG83 108	SG84 109
1	14.8742	14.2724
2	2.95975	2.01288
3	2.78382	1.46325
4	15.1625	9.36591
5	12.4625	14.1362
6	2.26361	4.79266
7	1.90035	4.54905
8	2.30259	1.55357
9	2.38638	2.54233
10	1.03915	2.44986
11	4.18750	2.90503
12	6.50680	3.95577
13	1.32369	.836326
14	6.54072	5.62341
15	2.60839	1.61583
16	5.83774	7.57331
17	2.05325	3.56487
18	4.27331	4.16674
19	7.81201	10.8662
20	.721712	1.75438
21	100.000	100.000

open output con

```
open data b:lab2
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 ST63 ST64 ST65 ST66 ST67 ST68 ST69 ST70 ST71 ST72 ST73 $
ST74 ST75 ST76 ST77 ST78 ST79 ST80 ST81 ST82 ST83 ST84

set SG63 1963,1 1963,21 = (ST63(t)/8914)*100
set SG64 1963,1 1963,21 = (ST64(t)/9011)*100
set SG65 1963,1 1963,21 = (ST65(t)/9108)*100
set SG66 1963,1 1963,21 = (ST66(t)/9236)*100
set SG67 1963,1 1963,21 = (ST67(t)/9034)*100
set SG68 1963,1 1963,21 = (ST68(t)/8946)*100
set SG69 1963,1 1963,21 = (ST69(t)/8926)*100
set SG70 1963,1 1963,21 = (ST70(t)/8911)*100
set SG71 1963,1 1963,21 = (ST71(t)/8057)*100
set SG72 1963,1 1963,21 = (ST72(t)/7777)*100
set SG73 1963,1 1963,21 = (ST73(t)/7828)*100
set SG74 1963,1 1963,21 = (ST74(t)/7873)*100
set SG75 1963,1 1963,21 = (ST75(t)/7487)*100
set SG76 1963,1 1963,21 = (ST76(t)/7250)*100
set SG77 1963,1 1963,21 = (ST77(t)/7293)*100
set SG78 1963,1 1963,21 = (ST78(t)/7257)*100
set SG79 1963,1 1963,21 = (ST79(t)/7179)*100
set SG80 1963,1 1963,21 = (ST80(t)/6807)*100
set SG81 1963,1 1963,21 = (ST81(t)/6224)*100
set SG82 1963,1 1963,21 = (ST82(t)/5896)*100
set SG83 1963,1 1963,21 = (ST83(t)/5602)*100
set SG84 1963,1 1963,21 = (ST84(t)/5536)*100
print 1963,1 1963,21 SG63 SG64 SG65 SG66 SG67 SG68 SG69 SG70 SG71 SG72 SG73 $
SG74 SG75 SG76 SG77 SG78 SG79 SG80 SG81 SG82 SG83 SG84
```

ENTRY	SG63 23	SG64 24	SG65 25	SG66 26
1	7.15728	7.01365	6.97189	7.07016
2	1.83980	1.83110	1.82257	1.81897
3	.549697	.532682	.527009	.541360
4	9.50191	9.37743	9.09091	8.85665
5	6.48418	6.33670	6.18138	6.04158
6	.504824	.499390	.505051	.519706
7	2.75970	2.79658	2.83267	2.96665
8	2.68118	2.66341	2.65700	2.60935
9	4.40880	4.37243	4.40272	4.47163
10	.717972	.710243	.680720	.649632
11	2.27732	2.40817	2.48134	2.51191
12	5.19408	5.13816	5.13834	5.16457
13	.650662	.599268	.603865	.595496
14	3.90397	3.99512	3.97453	3.99524
15	6.76464	6.98036	6.99385	6.79948
16	6.28225	6.40328	6.54370	6.53963
17	14.9540	14.8818	15.4370	15.7319
18	9.47947	9.87682	9.84848	10.1559
19	12.6206	12.3516	12.0663	11.6609
20	1.26767	1.23183	1.24067	1.29926
21	100.000	100.000	100.000	100.000

ENTRY	SG67 27	SG68 28	SG69 29	SG70 30
1	7.23932	7.19875	7.59579	7.70957
2	1.83750	1.81087	1.74770	1.77309
3	.542395	.525374	.492942	.516216
4	8.50122	8.39481	8.33520	8.03501
5	5.89993	5.85737	5.92651	5.62226
6	.520257	.536553	.504145	.493772
7	2.93336	3.17460	3.00246	2.87285
8	2.60128	2.60452	2.61035	2.61475
9	4.56055	4.63894	4.66054	4.73572
10	.642019	.648334	.649787	.605993
11	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	3.97388	4.04650	3.92113	3.82673
15	6.67478	6.61748	6.55389	6.64347
16	6.44233	6.50570	7.13646	7.18213
17	16.0837	15.8842	15.0907	15.3855
18	10.2834	10.3286	10.2622	10.2345
19	11.6449	11.5023	11.5841	11.6822
20	1.29511	1.35256	1.33318	1.35787
21	100.000	100.000	100.000	100.000

ENTRY	SG71 31	SG72 32	SG73 33	SG74 34
1	7.42212	7.53504	7.47317	7.49397
2	1.62592	1.65874	1.64793	1.71472
3	.508874	.527196	.510986	.520767
4	7.72000	7.67648	7.58815	7.43046
5	5.64726	5.78629	5.62085	5.42360
6	.471640	.475762	.485437	.469961
7	2.86707	3.06031	3.24476	3.12460
8	2.79260	2.88029	2.81042	2.90868
9	4.60469	4.56474	4.52223	4.57259
10	.583344	.591488	.574859	.546170
11	2.89190	3.02173	3.15534	3.21351
12	5.43627	5.47769	5.45478	5.52521
13	.546109	.540054	.510986	.508066
14	3.81035	3.87039	3.89627	3.82319
15	6.91324	6.63495	6.61727	6.43973
16	7.14906	7.14929	7.24323	7.39235
17	15.1049	14.5557	14.4098	14.4418
18	10.0658	10.1839	10.3219	10.7075
19	12.5233	12.4727	12.5703	12.4095
20	1.31563	1.33728	1.34134	1.33367
21	100.000	100.000	100.000	100.000

ENTRY	SG75 35	SG76 36	SG77 37	SG78 38
1	7.39949	7.54483	7.44550	7.41353
2	1.74970	1.76552	1.78253	1.76381
3	.547616	.537931	.521048	.523632
4	7.06558	7.07586	7.02043	6.75210
5	5.36931	5.25517	5.32017	5.20876
6	.454120	.468966	.493624	.482293
7	3.07199	3.17241	3.04401	3.04534
8	2.92507	2.82759	2.74236	2.74218
9	4.62134	4.64828	4.62087	4.69891
10	.560972	.551724	.562183	.523632
11	3.11206	3.17241	3.16742	3.15557
12	5.74329	5.83448	5.97834	6.06311
13	.520903	.510345	.507336	.551192
14	3.68639	3.69655	3.61991	3.65165
15	6.69160	6.46897	6.62279	6.32493
16	7.29264	7.20000	7.33580	7.46865
17	14.9058	14.8828	14.7402	14.9235
18	10.4314	10.1931	10.3250	10.4451
19	12.5551	12.8138	12.7794	12.8841
20	1.29558	1.37931	1.37118	1.37798
21	100.000	100.000	100.000	100.000

ENTRY	SG79 39	SG80 40	SG81 41	SG82 42
1	7.43836	7.63919	8.61183	8.81954
2	1.76905	1.83634	1.94409	1.98440
3	.515392	.514177	.498072	.508820
4	6.65831	6.22888	4.64332	4.56242
5	5.32108	5.20053	5.33419	5.17300
6	.487533	.470104	.514139	.525780
7	3.10628	3.12913	3.02057	2.93419
8	2.74411	2.79124	2.82776	2.64586
9	4.80568	4.99486	5.49486	5.88535
10	.529322	.514177	.449871	.440977
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

14	3.64953	3.64331	3.74357	3.71438
15	6.18471	5.89099	4.40231	4.27408
16	7.41050	7.46291	6.68380	6.81818
17	14.8349	14.8083	17.4968	17.6391
18	10.4611	10.6949	10.8933	10.9735
19	12.8569	12.8838	11.8252	11.4824
20	1.37902	1.27810	1.38175	1.40773
21	100.000	100.000	100.000	100.000

ENTRY	SG83 43	SG84 44
1	8.96109	9.06792
2	1.91003	1.95087
3	.499821	.415462
4	4.44484	4.38945
5	5.14102	5.18425
6	.535523	.541908
7	3.14174	3.19725
8	2.62406	2.63728
9	6.14066	6.19581
10	.428418	.433526
11	3.19529	3.21532
12	6.19422	6.25000
13	.714031	.704480
14	3.58800	3.59465
15	3.99857	3.79335
16	6.74759	6.91835
17	17.3866	17.4675
18	11.4959	11.8858
19	11.4423	10.8382
20	1.41021	1.31864
21	100.000	100.000

open output con

```
open data b:ch2
cal 1963 1 1
all 0 1963,20
data 1963,1 1963,20 GR63 UK63 GR68 UK68 GR74 UK74 GR78 UK78 GR84 UK84 $
EGR63 EUK63 EGR68 EUK68 EGR74 EUK74 EGR78 EUK78 EGR84 EUK84


cmoment(print,corr) 63,1 63,20
# GR63 UK63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR     1      GR63
VAR     2      UK63

CORRELATION MATRIX
    VARIABLE              GR63           UK63
          SERIES LAG       1    0         2    0
    GR63        1    0   1.0000          .57364
    UK63        2    0   .57364          1.0000



cmoment(print,corr) 63,1 63,20
# GR68 UK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR     3      GR68
VAR     4      UK68

CORRELATION MATRIX
    VARIABLE              GR68           UK68
          SERIES LAG       3    0         4    0
    GR68        3    0   1.0000          .65223
    UK68        4    0   .65223          1.0000



cmoment(print,corr) 63,1 63,20
# GR74 UK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR     5      GR74
VAR     6      UK74

CORRELATION MATRIX
    VARIABLE              GR74           UK74
          SERIES LAG       5    0         6    0
    GR74        5    0   1.0000          .59722
    UK74        6    0   .59722          1.0000



cmoment(print,corr) 63,1 63,20
# GR78 UK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR     7      GR78
VAR     8      UK78

CORRELATION MATRIX
    VARIABLE              GR78           UK78
          SERIES LAG       7    0         8    0
    GR78        7    0   1.0000          .54832
    UK78        8    0   .54832          1.0000
```

```
cmoment(print,corr) 63,1 63,20
# GR84 UK84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR     9       GR84
VAR    10       UK84

CORRELATION MATRIX
    VARIABLE              GR84           UK84
          SERIES LAG       9    0        10    0
    GR84        9    0    1.0000         .59376
    UK84       10    0    .59376         1.0000


cmoment(print,corr) 63,1 63,20
# EGR63 EUK63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    11       EGR63
VAR    12       EUK63

CORRELATION MATRIX
    VARIABLE              EGR63          EUK63
          SERIES LAG       11   0        12    0
    EGR63      11    0    1.0000         .31082
    EUK63      12    0    .31082         1.0000


cmoment(print,corr) 63,1 63,20
# EGR68 EUK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    13       EGR68
VAR    14       EUK68

CORRELATION MATRIX
    VARIABLE              EGR68          EUK68
          SERIES LAG       13   0        14    0
    EGR68      13    0    1.0000         .29293
    EUK68      14    0    .29293         1.0000


cmoment(print,corr) 63,1 63,20
# EGR74 EUK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    15       EGR74
VAR    16       EUK74

CORRELATION MATRIX
    VARIABLE              EGR74          EUK74
          SERIES LAG       15   0        16    0
    EGR74      15    0    1.0000         .42464
    EUK74      16    0    .42464         1.0000


cmoment(print,corr) 63,1 63,20
# EGR78 EUK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
```

```
CORRELATION MATRIX
    VARIABLE              EGR78         EUK78
          SERIES LAG      17    0       18    0
    EGR78       17    0   1.0000        .41629
    EUK78       18    0   .41629        1.0000


cmoment(print,corr) 63,1 63,20
# EGR84 EUK84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR   19      EGR84
VAR   20      EUK84

CORRELATION MATRIX
    VARIABLE              EGR84         EUK84
          SERIES LAG      19    0       20    0
    EGR84       19    0   1.0000        .37947
    EUK84       20    0   .37947        1.0000


end

         NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS         0 WARNINGS
```

```
open data b:growth
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 SGR68 SUK68 SGR74 SUK74 SGR78 SUK78 SGR84 SUK84 SGR894 $
SUK894 EGR68 EUK68 EGR74 EUK74 EGR78 EUK78 EGR84 EUK84 EGR894 EUK894 GGR68 $
GUK68 GGR74 GUK74 GGR78 GUK78 GGR84 GUK84 GGR894 GUK894


cmoment(print,corr) 63,1 63,21
# EGR68 EUK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    11       EGR68
VAR    12       EUK68

CORRELATION MATRIX
    VARIABLE              EGR68          EUK68
          SERIES LAG     11    0         12    0
    EGR68       11    0   1.0000          .27860
    EUK68       12    0   .27860         1.0000


cmoment(print,corr) 63,1 63,21
# EGR74 EUK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    13       EGR74
VAR    14       EUK74

CORRELATION MATRIX
    VARIABLE              EGR74          EUK74
          SERIES LAG     13    0         14    0
    EGR74       13    0   1.0000       -.80239E-01
    EUK74       14    0 -.80239E-01     1.0000


cmoment(print,corr) 63,1 63,21
# EGR78 EUK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    15       EGR78
VAR    16       EUK78

CORRELATION MATRIX
    VARIABLE              EGR78          EUK78
          SERIES LAG     15    0         16    0
    EGR78       15    0   1.0000        -.16637
    EUK78       16    0  -.16637         1.0000


cmoment(print,corr) 63,1 63,21
# EGR84 EUK84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    17       EGR84
VAR    18       EUK84

CORRELATION MATRIX
    VARIABLE              EGR84          EUK84
          SERIES LAG     17    0         18    0
    EGR84       17    0   1.0000        [illegible]
```

```
cmoment(print,corr) 63,1 63,21
# EGR894 EUK894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   19      EGR894
VAR   20      EUK894

CORRELATION MATRIX
    VARIABLE             EGR894         EUK894
          SERIES LAG     19   0         20   0
    EGR894     19   0    1.0000       -.26189E-01
    EUK894     20   0  -.26189E-01     1.0000


cmoment(print,corr) 63,1 63,21
# SGR68 SUK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    1      SGR68
VAR    2      SUK68

CORRELATION MATRIX
    VARIABLE             SGR68          SUK68
          SERIES LAG      1   0          2   0
    SGR68       1   0    1.0000        .38375
    SUK68       2   0    .38375        1.0000


cmoment(print,corr) 63,1 63,21
# SGR74 SUK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    3      SGR74
VAR    4      SUK74

CORRELATION MATRIX
    VARIABLE             SGR74          SUK74
          SERIES LAG      3   0          4   0
    SGR74       3   0    1.0000        -.41215
    SUK74       4   0   -.41215         1.0000


cmoment(print,corr) 63,1 63,21
# SGR78 SUK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    5      SGR78
VAR    6      SUK78

CORRELATION MATRIX
    VARIABLE             SGR78          SUK78
          SERIES LAG      5   0          6   0
    SGR78       5   0    1.0000        -.56893
    SUK78       6   0   -.56893         1.0000


cmoment(print,corr) 63,1 63,21
# SGR84 SUK84

VARIABLES IN CROSS-MOMENT MATRIX
```

```
VAR     8      SUK84

CORRELATION MATRIX
    VARIABLE              SGR84          SUK84
          SERIES LAG      7    0          8    0
    SGR84        7    0   1.0000         .10834
    SUK84        8    0   .10834         1.0000



cmoment(print,corr) 63,1 63,21
# SGR894 SUK894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    9       SGR894
VAR   10       SUK894

CORRELATION MATRIX
    VARIABLE              SGR894         SUK894
          SERIES LAG      9    0         10    0
    SGR894       9    0   1.0000        -.40340E-01
    SUK894      10    0  -.40340E-01     1.0000



cmoment(print,corr) 63,1 63,21
# GGR68 SGR68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   21       GGR68
VAR    1       SGR68

CORRELATION MATRIX
    VARIABLE              GGR68          SGR68
          SERIES LAG     21    0          1    0
    GGR68       21    0   1.0000         .27846E-01
    SGR68        1    0   .27846E-01     1.0000



cmoment(print,corr) 63,1 63,21
# GUK68 SUK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   22       GUK68
VAR    2       SUK68

CORRELATION MATRIX
    VARIABLE              GUK68          SUK68
          SERIES LAG     22    0          2    0
    GUK68       22    0   1.0000        -.17746
    SUK68        2    0  -.17746         1.0000



cmoment(print,corr) 63,1 63,21
# GGR74 SGR74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   23       GGR74
VAR    3       SGR74

CORRELATION MATRIX
    VARIABLE              GGR74          SGR74
          SERIES LAG     23    0          3    0
    GGR74       23    0   1.0000         .71050E-02
```

```
cmoment(print,corr) 63,1 63,21
# GUK74 SUK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    24       GUK74
VAR     4       SUK74

CORRELATION MATRIX
    VARIABLE              GUK74          SUK74
          SERIES LAG    24    0         4    0
    GUK74      24    0    1.0000        .12766
    SUK74       4    0    .12766        1.0000


cmoment(print,corr) 63,1 63,21
# GGR78 SGR78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    25       GGR78
VAR     5       SGR78

CORRELATION MATRIX
    VARIABLE              GGR78          SGR78
          SERIES LAG    25    0         5    0
    GGR78      25    0    1.0000        .28570
    SGR78       5    0    .28570        1.0000


cmoment(print,corr) 63,1 63,21
# GUK78 SUK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    26       GUK78
VAR     6       SUK78

CORRELATION MATRIX
    VARIABLE              GUK78          SUK78
          SERIES LAG    26    0         6    0
    GUK78      26    0    1.0000        .55933
    SUK78       6    0    .55933        1.0000


cmoment(print,corr) 63,1 63,21
# GGR84 SGR84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    27       GGR84
VAR     7       SGR84

CORRELATION MATRIX
    VARIABLE              GGR84          SGR84
          SERIES LAG    27    0         7    0
    GGR84      27    0    1.0000        .57618
    SGR84       7    0    .57618        1.0000


cmoment(print,corr) 63,1 63,21
# GUK84 SUK84

VARIABLES IN CROSS-MOMENT MATRIX
```

```
VAR     8       SUK84

CORRELATION MATRIX
    VARIABLE              GUK84          SUK84
          SERIES LAG    28    0           8    0
    GUK84       28   0    1.0000        -.12098E-01
    SUK84        8   0  -.12098E-01    1.0000



cmoment(print,corr) 63,1 63,21
# GGR894 SGR894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   29       GGR894
VAR    9       SGR894

CORRELATION MATRIX
    VARIABLE              GGR894         SGR894
          SERIES LAG    29    0           9    0
    GGR894      29   0    1.0000        -.80415E-01
    SGR894       9   0  -.80415E-01    1.0000



cmoment(print,corr) 63,1 63,21
# GUK894 SUK894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   30       GUK894
VAR   10       SUK894

CORRELATION MATRIX
    VARIABLE              GUK894         SUK894
          SERIES LAG    30    0          10    0
    GUK894      30   0    1.0000         .13195E-01
    SUK894      10   0    .13195E-01    1.0000



cmoment(print,corr) 63,1 63,21
# GGR68 EGR68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   21       GGR68
VAR   11       EGR68

CORRELATION MATRIX
    VARIABLE              GGR68          EGR68
          SERIES LAG    21    0          11    0
    GGR68       21   0    1.0000         .82677
    EGR68       11   0    .82677        1.0000



cmoment(print,corr) 63,1 63,21
# GUK68 EUK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   22       GUK68
VAR   12       EUK68

CORRELATION MATRIX
    VARIABLE              GUK68          EUK68
          SERIES LAG    22    0          12    0
    GUK68       22   0    1.0000        [illegible]
```

```
cmoment(print,corr) 63,1 63,21
# GGR74 EGR74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    23       GGR74
VAR    13       EGR74

CORRELATION MATRIX
    VARIABLE                GGR74          EGR74
          SERIES LAG        23    0        13    0
    GGR74       23    0     1.0000         .68679
    EGR74       13    0     .68679         1.0000


cmoment(print,corr) 63,1 63,21
# GUK74 EUK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    24       GUK74
VAR    14       EUK74

CORRELATION MATRIX
    VARIABLE                GUK74          EUK74
          SERIES LAG        24    0        14    0
    GUK74       24    0     1.0000         .14289
    EUK74       14    0     .14289         1.0000


cmoment(print,corr) 63,1 63,21
# GGR78 EGR78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    25       GGR78
VAR    15       EGR78

CORRELATION MATRIX
    VARIABLE                GGR78          EGR78
          SERIES LAG        25    0        15    0
    GGR78       25    0     1.0000        -.59688
    EGR78       15    0    -.59688         1.0000


cmoment(print,corr) 63,1 63,21
# GUK78 EUK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    26       GUK78
VAR    16       EUK78

CORRELATION MATRIX
    VARIABLE                GUK78          EUK78
          SERIES LAG        26    0        16    0
    GUK78       26    0     1.0000         .60228
    EUK78       16    0     .60228         1.0000


cmoment(print,corr) 63,1 63,21
# GGR84 EGR84

VARIABLES IN CROSS-MOMENT MATRIX
```

```
VAR    17       EGR84

CORRELATION MATRIX
    VARIABLE               GGR84            EGR84
          SERIES LAG     27    0          17    0
    GGR84       27    0    1.0000           .96461E-01
    EGR84       17    0    .96461E-01     1.0000



cmoment(print,corr) 63,1 63,21
# GUK84 EUK84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    28       GUK84
VAR    18       EUK84

CORRELATION MATRIX
    VARIABLE               GUK84            EUK84
          SERIES LAG     28    0          18    0
    GUK84       28    0    1.0000           .60942
    EUK84       18    0    .60942           1.0000



cmoment(print,corr) 63,1 63,21
# GGR894 EGR894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    29       GGR894
VAR    19       EGR894

CORRELATION MATRIX
    VARIABLE               GGR894           EGR894
          SERIES LAG     29    0          19    0
    GGR894      29    0    1.0000           .51514
    EGR894      19    0    .51514           1.0000



cmoment(print,corr) 63,1 63,21
# GUK894 EUK894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    30       GUK894
VAR    20       EUK894

CORRELATION MATRIX
    VARIABLE               GUK894           EUK894
          SERIES LAG     30    0          20    0
    GUK894      30    0    1.0000           .33679
    EUK894      20    0    .33679           1.0000



cmoment(print,corr) 63,1 63,21
# EGR68 SGR68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    11       EGR68
VAR     1       SGR68

CORRELATION MATRIX
    VARIABLE               EGR68            SGR68
          SERIES LAG     11    0           1    0
    EGR68       11    0    1.0000           [illegible]
```

```
cmoment(print,corr) 63,1 63,21
# EUK68 SUK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    12       EUK68
VAR     2       SUK68

CORRELATION MATRIX
    VARIABLE              EUK68          SUK68
          SERIES LAG      12    0         2    0
    EUK68       12    0   1.0000         .42654
    SUK68        2    0   .42654         1.0000


cmoment(print,corr) 63,1 63,21
# EGR74 SGR74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    13       EGR74
VAR     3       SGR74

CORRELATION MATRIX
    VARIABLE              EGR74          SGR74
          SERIES LAG      13    0         3    0
    EGR74       13    0   1.0000         .41166
    SGR74        3    0   .41166         1.0000


cmoment(print,corr) 63,1 63,21
# EUK74 SUK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    14       EUK74
VAR     4       SUK74

CORRELATION MATRIX
    VARIABLE              EUK74          SUK74
          SERIES LAG      14    0         4    0
    EUK74       14    0   1.0000         .22148
    SUK74        4    0   .22148         1.0000


cmoment(print,corr) 63,1 63,21
# EGR78 SGR78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    15       EGR78
VAR     5       SGR78

CORRELATION MATRIX
    VARIABLE              EGR78          SGR78
          SERIES LAG      15    0         5    0
    EGR78       15    0   1.0000         .17207
    SGR78        5    0   .17207         1.0000


cmoment(print,corr) 63,1 63,21
# EUK78 SUK78

VARIABLES IN CROSS-MOMENT MATRIX
```

```
VAR     6       SUK78

CORRELATION MATRIX
    VARIABLE                 EUK78          SUK78
          SERIES LAG    16    0          6    0
    EUK78       16    0    1.0000         .54724
    SUK78        6    0    .54724         1.0000


cmoment(print,corr) 63,1 63,21
# EGR84 SGR84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    17       EGR84
VAR     7       SGR84

CORRELATION MATRIX
    VARIABLE                 EGR84          SGR84
          SERIES LAG    17    0          7    0
    EGR84       17    0    1.0000         .57893
    SGR84        7    0    .57893         1.0000


cmoment(print,corr) 63,1 63,21
# EUK84 SUK84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    18       EUK84
VAR     8       SUK84

CORRELATION MATRIX
    VARIABLE                 EUK84          SUK84
          SERIES LAG    18    0          8    0
    EUK84       18    0    1.0000         .18553
    SUK84        8    0    .18553         1.0000


cmoment(print,corr) 63,1 63,21
# EGR894 SGR894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    19       EGR894
VAR     9       SGR894

CORRELATION MATRIX
    VARIABLE                 EGR894         SGR894
          SERIES LAG    19    0          9    0
    EGR894      19    0    1.0000         .51541
    SGR894       9    0    .51541         1.0000


cmoment(print,corr) 63,1 63,21
# EUK894 SUK894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    20       EUK894
VAR    10       SUK894

CORRELATION MATRIX
    VARIABLE                 EUK894         SUK894
          SERIES LAG    20    0         10    0
    EUK894      20    0    1.0000         [illegible]
```

```
end


           NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:data1.bak
cal 1963 1 1
all 0 1963.21
data 1963,1 1963,21 S63 S64 S65 S66 S67 S68 S69 S70 S71 S72 S73 S74 S75 S76 $
S77 S78 S79 S80 S81 S82 S83 S84 L63 L64 L65 L66 L67 L68 L69 L70 L71 L72 L73 $
L74 L75 L76 L77 L78 L79 L80 L81 L82 L83 L84


set I63 1963,1 1963,21 = (S63(t)/L63(t))*1000
set I64 1963,1 1963,21 = (S64(t)/L64(t))*1000
set I65 1963,1 1963,21 = (S65(t)/L65(t))*1000
set I66 1963,1 1963,21 = (S66(t)/L66(t))*1000
set I67 1963,1 1963,21 = (S67(t)/L67(t))*1000
set I68 1963,1 1963,21 = (S68(t)/L68(t))*1000
set I69 1963,1 1963,21 = (S69(t)/L69(t))*1000
set I70 1963,1 1963,21 = (S70(t)/L70(t))*1000
set I71 1963,1 1963,21 = (S71(t)/L71(t))*1000
set I72 1963,1 1963,21 = (S72(t)/L72(t))*1000
set I73 1963,1 1963,21 = (S73(t)/L73(t))*1000
set I74 1963,1 1963,21 = (S74(t)/L74(t))*1000
set I75 1963,1 1963,21 = (S75(t)/L75(t))*1000
set I76 1963,1 1963,21 = (S76(t)/L76(t))*1000
set I77 1963,1 1963,21 = (S77(t)/L77(t))*1000
set I78 1963,1 1963,21 = (S78(t)/L78(t))*1000
set I79 1963,1 1963,21 = (S79(t)/L79(t))*1000
set I80 1963,1 1963,21 = (S80(t)/L80(t))*1000
set I81 1963,1 1963,21 = (S81(t)/L81(t))*1000
set I82 1963,1 1963,21 = (S82(t)/L82(t))*1000
set I83 1963,1 1963,21 = (S83(t)/L83(t))*1000
set I84 1963,1 1963,21 = (S84(t)/L84(t))*1000
set D68 1963,1 1963,21 = ((I68(t)/I63(t))-1)*100
set D74 1963,1 1963,21 = ((I74(t)/I68(t))-1)*100
set D78 1963,1 1963,21 = ((I78(t)/I74(t))-1)*100
set D84 1963,1 1963,21 = ((I84(t)/I78(t))-1)*100
set D94 1963,1 1963,21 = ((I84(t)/I63(t))-1)*100
set R63 1963,1 1963,21 = (I63(t)/74.8784)*100
set R64 1963,1 1963,21 = (I64(t)/90.3892)*100
set R65 1963,1 1963,21 = (I65(t)/118.446)*100
set R66 1963,1 1963,21 = (I66(t)/130.545)*100
set R67 1963,1 1963,21 = (I67(t)/143.802)*100
set R68 1963,1 1963,21 = (I68(t)/165.548)*100
set R69 1963,1 1963,21 = (I69(t)/177.458)*100
set R70 1963,1 1963,21 = (I70(t)/197.202)*100
set R71 1963,1 1963,21 = (I71(t)/437.784)*100
set R72 1963,1 1963,21 = (I72(t)/502.128)*100
set R73 1963,1 1963,21 = (I73(t)/246.991)*100
set R74 1963,1 1963,21 = (I74(t)/270.548)*100
set R75 1963,1 1963,21 = (I75(t)/295.738)*100
set R76 1963,1 1963,21 = (I76(t)/559.318)*100
set R77 1963,1 1963,21 = (I77(t)/574.752)*100
set R78 1963,1 1963,21 = (I78(t)/345.994)*100
set R79 1963,1 1963,21 = (I79(t)/584.465)*100
set R80 1963,1 1963,21 = (I80(t)/334.585)*100
set R81 1963,1 1963,21 = (I81(t)/340.790)*100
set R82 1963,1 1963,21 = (I82(t)/760.592)*100
set R83 1963,1 1963,21 = (I83(t)/666.342)*100
set R84 1963,1 1963,21 = (I84(t)/352.797)*100
```

```
set S78 1963,1 1963,21 = ((R78(t)/R74(t))-1)*100
set S84 1963,1 1963,21 = ((R84(t)/R78(t))-1)*100
set S94 1963,1 1963,21 = ((R84(t)/R63(t))-1)*100
print 1963,1 1963,21 I63 I64 I65 I66 I67 I68 I69 I70 I71 I72 I73 I74 I75 I76 &
I77 I78 I79 I80 I81 I82 I83 I84 D68 D74 D78 D84 D94 R63 R64 R65 R66 R67 R68 &
R69 R70 R71 R72 R73 R74 R75 R76 R77 R78 R79 R80 R81 R82 R83 R84 S68 S74 S78 &
S84 S94
```

ENTRY	I63 45	I64 46	I65 47	I66 48
1	65.7274	64.9155	69.2546	69.6524
2	155.734	156.137	186.555	202.829
3	37.0395	43.4191	46.6126	58.4256
4	107.731	123.475	133.893	137.702
5	2.08542	2.97815	1.96474	2.33387
6	5.92449	12.6280	15.4381	22.3889
7	4.61592	4.47405	7.08944	7.56437
8	282.797	339.104	342.643	358.667
9	10.6065	31.2060	36.6303	37.9895
10	23.8120	27.3105	31.9286	32.8940
11	102.206	112.136	117.939	132.084
12	489.928	595.116	898.995	973.532
13	100.203	521.940	1278.61	1230.14
14	121.110	137.862	154.541	171.811
15	1053.63	2228.94	2937.54	2439.45
16	35.9918	42.1821	50.8555	67.3084
17	18.6602	20.8902	20.6753	36.5542
18	63.5820	66.9291	74.1391	89.6199
19	72.1141	83.1525	84.1184	87.3932
20	11.5375	15.0080	16.3012	16.4975
21	74.8784	90.3892	118.446	130.545

ENTRY	I67 49	I68 50	I69 51	I70 52
1	73.8063	84.7525	98.7030	118.595
2	220.911	234.008	227.621	273.954
3	83.1480	109.982	139.602	148.805
4	148.766	171.900	188.936	212.956
5	2.64821	4.59993	6.22315	7.46889
6	26.5709	31.7584	37.9217	38.2325
7	7.99092	10.3989	16.6558	17.2200
8	440.929	494.779	548.925	585.729
9	46.4037	47.2644	58.0195	64.7534
10	34.1389	35.3952	37.8598	34.0605
11	151.030	194.901	214.249	241.948
12	927.893	960.689	873.752	925.275
13	1416.92	1236.14	1888.29	1366.27
14	194.491	255.817	269.839	313.222
15	2797.85	2968.86	2745.53	2989.59
16	100.478	113.100	105.542	124.774
17	44.1864	48.9249	51.1413	59.2275
18	95.5544	103.108	123.476	142.871
19	98.2630	120.994	133.149	125.631
20	17.5521	17.4628	26.4699	24.6736
21	143.802	165.548	177.458	197.202

ENTRY	I71 53	I72 54	I73 55	I74 56
1	289.719	347.076	158.963	152.167
2	580.154	654.158	441.537	471.246
3	157.719	179.067	160.239	151.003
4	313.594	369.216	290.153	318.679
5	35.0589	49.5295	16.2293	19.9148
6	214.516	255.217	70.5110	90.8796
7	89.8477	95.6720	23.4675	28.4890
8	745.267	914.385	745.954	725.457
9	134.542	178.711	99.6680	104.235
10	94.0302	119.020	30.0130	33.5839
11	390.410	433.066	274.444	268.043
12	1164.24	1196.67	930.091	909.053

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	302.823	349.888	148.757	197.119
17	132.645	171.139	69.8401	74.1305
18	219.633	252.792	151.249	220.882
19	287.865	328.528	155.601	200.153
20	108.230	137.035	32.5566	41.3038
21	437.784	502.128	246.991	270.548

ENTRY	I75 57	I76 58	I77 59	I78 60
1	166.794	398.864	442.854	254.834
2	501.515	876.677	785.491	665.461
3	185.745	231.722	204.161	212.363
4	367.282	507.282	543.303	470.061
5	24.2298	60.2729	72.9811	35.7110
6	92.9595	383.113	385.821	109.243
7	25.7256	156.491	159.584	41.3588
8	840.975	1112.21	1165.86	946.476
9	112.316	224.587	224.662	134.336
10	33.3736	124.191	125.913	43.0280
11	291.485	416.515	442.202	376.745
12	959.321	1099.25	1054.20	873.467
13	3202.82	3082.29	2731.13	2144.57
14	599.404	1185.47	1209.60	773.667
15	2098.46	2168.72	2136.38	2216.69
16	215.618	506.969	513.529	275.936
17	81.9997	195.126	230.532	127.671
18	280.743	449.404	446.102	313.707
19	232.040	413.947	500.613	290.664
20	47.7081	191.283	225.806	108.254
21	295.738	559.318	574.752	345.994

ENTRY	I79 61	I80 62	I81 63	I82 64
1	484.100	223.757	328.258	557.018
2	857.058	673.910	1084.96	1616.79
3	140.464	252.356	250.333	222.070
4	566.858	425.915	532.563	612.303
5	81.1128	38.5451	28.5748	123.012
6	513.016	130.981	116.711	667.454
7	172.569	32.0552	27.3357	272.593
8	1334.12	982.042	931.631	1359.56
9	244.808	131.705	117.247	399.737
10	208.587	56.7889	51.0311	329.171
11	464.179	308.026	387.682	501.865
12	1062.65	823.240	796.793	1242.19
13	1984.07	2265.28	1329.27	2020.37
14	1190.18	775.417	959.977	2012.87
15	2350.88	1857.18	1835.86	3694.42
16	641.781	282.957	389.877	915.209
17	236.384	122.747	118.847	312.681
18	509.816	274.483	221.375	493.212
19	405.061	298.706	248.983	530.986
20	322.902	102.277	77.0833	567.010
21	584.465	334.585	340.790	760.592

ENTRY	I83 65	I84 66	D68 67	D74 68
1	436.417	242.082	28.9456	79.5422
2	1129.23	700.988	50.2612	101.380
3	229.426	219.407	196.931	37.2980
4	515.418	409.093	59.5638	85.3857
5	79.9293	35.8636	120.576	332.938
6	468.799	108.052	436.054	186.159
7	173.971	36.0581	125.284	173.961
8	870.383	780.173	74.9594	46.6225
9	334.571	172.390	345.617	120.537
10	206.821	41.8322	48.6442	-5.11754
11	472.373	364.604	90.6938	37.5276
12	1001.05	894.706	96.0878	-5.37494

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	848.922	346.714	214.238	74.2874
17	304.032	85.3610	162.188	51.5190
18	425.567	219.058	62.1659	114.223
19	857.842	355.763	67.7815	65.4235
20	443.353	96.1899	51.3567	136.524
21	666.342	352.797	121.090	63.4255

ENTRY	D78 69	D84 70	D94 71	R63 72
1	67.4707	-5.00405	268.313	87.7788
2	41.2131	5.33870	350.119	207.983
3	40.6354	3.31701	492.361	49.4661
4	47.5032	-12.9703	279.734	143.875
5	79.3186	.427377	1619.73	2.78507
6	20.2063	-1.09053	1723.81	7.91215
7	45.1747	-12.8163	681.168	6.16456
8	30.4661	-17.5707	175.878	377.674
9	28.8777	28.3277	1525.33	14.1650
10	28.1212	-2.77921	75.6767	31.8010
11	40.5540	-3.22274	256.733	136.497
12	-3.91461	2.43163	82.6199	654.298
13	-31.5437	-4.13177	1951.80	133.821
14	50.4484	11.3113	611.069	161.743
15	2.85474	19.5244	151.462	1407.12
16	39.9843	25.6504	863.314	48.0671
17	72.2247	-33.1399	357.449	24.9207
18	42.0248	-30.1711	244.528	84.9137
19	45.2212	22.4036	393.362	96.3083
20	162.093	-11.1445	733.714	15.4084
21	27.8864	1.96620	371.160	100.000

ENTRY	R64 73	R65 74	R66 75	R67 76
1	71.8178	58.4693	53.3551	51.3250
2	172.739	157.502	155.371	153.622
3	48.0357	39.3535	44.7551	57.8212
4	136.604	113.041	105.482	103.452
5	3.29481	1.65877	1.78779	1.84157
6	13.9708	13.0339	17.1503	18.4774
7	4.94976	5.98538	5.79445	5.55689
8	375.160	289.282	274.746	306.622
9	34.5240	30.9257	29.1007	32.2692
10	30.2143	26.9563	25.1975	23.7402
11	124.059	99.5719	101.179	105.026
12	658.393	758.992	745.744	645.257
13	577.436	1079.49	942.314	985.325
14	152.520	130.474	131.610	135.249
15	2465.94	2480.06	1868.67	1945.63
16	46.6672	42.9356	51.5596	69.8724
17	23.1114	17.4554	28.0012	30.7272
18	74.0455	62.5931	68.6505	66.4486
19	91.9938	71.0183	66.9449	68.3322
20	16.6037	13.7625	12.6374	12.2058
21	100.000	100.000	100.000	100.000

ENTRY	R68 77	R69 78	R70 79	R71 80
1	51.1951	55.6205	60.1387	66.1786
2	141.354	128.267	138.921	132.521
3	66.4349	78.6678	75.4581	36.0266
4	103.837	106.468	107.989	71.6322
5	2.77861	3.50683	3.78743	8.00826
6	19.1838	21.3694	19.3875	49.0005
7	6.28152	9.38578	8.73214	20.5233
8	298.873	309.327	297.020	170.236
9	28.5503	32.6948	32.8361	30.7325
10	21.3806	21.3345	17.2719	21.4787
11	117.731	120.732	122.690	89.1787
12	580.309	492.371	469.202	265.940

15	1793.35	1547.14	1516.01	716.423
16	68.3186	59.4746	63.2724	69.1717
17	29.5533	28.8188	30.0339	30.2993
18	62.2830	69.5804	72.4490	50.1693
19	73.0870	75.0314	63.7070	65.7550
20	10.5485	14.9161	12.5118	24.7221
21	100.000	100.000	100.000	100.000

ENTRY	R72 81	R73 82	R74 83	R75 84
1	69.1210	64.3598	56.2438	56.3991
2	130.277	178.767	174.182	169.581
3	35.6615	64.8763	55.8136	62.8074
4	73.5303	117.475	117.790	124.192
5	9.86391	6.57083	7.36093	8.19298
6	50.8271	28.5480	33.5909	31.4331
7	19.0533	9.50135	10.5301	8.69877
8	182.102	302.017	268.144	284.365
9	35.5908	40.3529	38.5275	37.9784
10	23.7031	12.1515	12.4133	11.2849
11	86.2462	111.115	99.0742	98.5618
12	238.319	376.569	336.004	324.382
13	745.820	1152.25	1157.93	1082.99
14	169.696	198.238	190.074	202.681
15	611.658	1123.74	796.592	709.568
16	69.6811	60.2275	72.8592	72.9084
17	34.0827	28.2764	27.4001	27.7271
18	50.3441	61.2365	81.6423	94.9296
19	65.4272	62.9988	73.9805	78.4615
20	27.2908	13.1813	15.2667	16.1319
21	100.000	100.000	100.000	100.000

ENTRY	R76 85	R77 86	R78 87	R79 88
1	71.3126	77.0512	73.6528	82.8279
2	156.740	136.666	192.333	146.640
3	41.4293	35.5216	61.3777	24.0329
4	90.6965	94.5283	135.858	96.9874
5	10.7761	12.6978	10.3213	13.8781
6	68.4965	67.1283	31.5736	87.7754
7	27.9788	27.7657	11.9536	29.5260
8	198.851	202.845	273.553	228.263
9	40.1538	39.0885	38.8261	41.8858
10	22.2040	21.9073	12.4361	35.6886
11	74.4683	76.9379	108.888	79.4195
12	196.535	183.419	252.451	181.816
13	551.081	475.184	619.830	339.468
14	211.949	210.456	223.607	203.636
15	387.744	371.704	640.672	402.228
16	90.6406	89.3479	79.7516	109.807
17	34.8865	40.1098	36.8998	40.4445
18	80.3485	77.6165	90.6683	87.2277
19	74.0093	87.1007	84.0084	69.3045
20	34.1994	39.2876	31.2879	55.2474
21	100.000	100.000	100.000	100.000

ENTRY	R80 89	R81 90	R82 91	R83 92
1	66.8760	96.3227	73.2348	65.4945
2	201.417	318.367	212.570	169.468
3	75.4237	73.4566	29.1970	34.4307
4	127.296	156.273	80.5035	77.3504
5	11.5203	8.39073	16.1732	11.9952
6	39.1474	34.2472	87.7546	70.3541
7	9.58058	8.02126	35.8396	26.1084
8	293.511	273.374	178.751	130.621
9	39.3636	34.4044	52.5560	50.2101
10	16.9729	14.9743	43.2782	31.0383
11	92.0620	113.760	65.9835	70.8905
12	246.048	233.808	163.319	150.231

16	84.5695	114.404	120.328	127.400
17	36.6864	34.8738	41.1102	45.6270
18	82.0369	64.9595	64.8458	63.8662
19	89.2766	73.0605	69.8122	128.739
20	30.5683	22.6190	74.5486	66.5354
21	100.000	100.000	100.000	100.000

ENTRY	R84 93	S68 6	S74 12	S78 16
1	68.6180	-41.6771	9.86166	30.9528
2	198.695	-32.0359	23.2245	10.4207
3	62.1908	34.3037	-15.9875	9.96905
4	115.957	-27.8283	13.4373	15.3393
5	10.1655	-.231993	164.914	40.2171
6	30.6271	142.460	75.1002	-6.00542
7	10.2206	1.89721	67.6363	13.5185
8	221.139	-20.8648	-10.2819	2.01720
9	48.8639	101.555	34.9462	.775156
10	11.8573	-32.7673	-41.9415	.183610
11	103.347	-13.7480	-15.8470	9.90536
12	253.604	-11.3083	-42.0990	-24.8666
13	582.761	457.981	55.0740	-46.4710
14	244.100	-4.46118	23.0034	17.6423
15	750.993	27.4480	-55.5808	-19.5733
16	98.2759	42.1318	6.64625	9.45989
17	24.1955	18.5894	-7.28571	34.6701
18	62.0918	-26.6514	31.0828	11.0555
19	100.846	-24.1114	1.22246	13.5549
20	27.2650	-31.5404	44.7288	104.942
21	100.000	.189929E-03	-.160556E-03	.297268E-04

ENTRY	S84 22	S94 94
1	-6.83586	-21.8285
2	3.30745	-4.46586
3	1.32474	25.7240
4	-14.6485	-19.4045
5	-1.50917	265.000
6	-2.99781	287.090
7	-14.4974	65.7969
8	-19.1602	-41.4471
9	25.8532	244.963
10	-4.65392	-62.7140
11	-5.08890	-24.2863
12	.456438	-61.2403
13	-5.98040	335.478
14	9.16490	50.9188
15	17.2196	-46.6292
16	23.2275	104.456
17	-34.4292	-2.91003
18	-31.5176	-26.8765
19	20.0433	4.71216
20	-12.8579	76.9492
21	-.194367E-04	.396627E-04

open output con

```
open data b:cintenss
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 I63 I64 I65 I66 I67 I68 I69 I70 I71 I72 I73 I74 I75 I76 $
I77 I78 I79 I80 I81 I82 I83 I84


set R63 1963,1 1963,21 = (I63(t)/5.7)*100
set R64 1963,1 1963,21 = (I64(t)/6.1)*100
set R65 1963,1 1963,21 = (I65(t)/6.1)*100
set R66 1963,1 1963,21 = (I66(t)/6.1)*100
set R67 1963,1 1963,21 = (I67(t)/6.6)*100
set R68 1963,1 1963,21 = (I68(t)/6.8)*100
set R69 1963,1 1963,21 = (I69(t)/7.2)*100
set R70 1963,1 1963,21 = (I70(t)/7.9)*100
set R71 1963,1 1963,21 = (I71(t)/8.7)*100
set R72 1963,1 1963,21 = (I72(t)/9.7)*100
set R73 1963,1 1963,21 = (I73(t)/10.0)*100
set R74 1963,1 1963,21 = (I74(t)/10.3)*100
set R75 1963,1 1963,21 = (I75(t)/10.5)*100
set R76 1963,1 1963,21 = (I76(t)/11.2)*100
set R77 1963,1 1963,21 = (I77(t)/11.4)*100
set R78 1963,1 1963,21 = (I78(t)/11.7)*100
set R79 1963,1 1963,21 = (I79(t)/12.2)*100
set R80 1963,1 1963,21 = (I80(t)/12.4)*100
set R81 1963,1 1963,21 = (I81(t)/13.2)*100
set R82 1963,1 1963,21 = (I82(t)/14.1)*100
set R83 1963,1 1963,21 = (I83(t)/14.9)*100
set R84 1963,1 1963,21 = (I84(t)/15.3)*100
print 1963,1 1963,21 R63 R64 R65 R66 R67 R68 R69 R70 R71 R72 R73 R74 R75 R76
R77 R78 R79 R80 R81 R82 R83 R84
```

ENTRY	R63 23	R64 24	R65 25	R66 26
1	112.281	113.115	114.754	113.115
2	142.105	144.262	152.459	155.738
3	75.4386	81.9672	85.2459	85.2459
4	78.9474	78.6885	80.3279	80.3279
5	29.8246	29.5082	29.5082	29.5082
6	45.6140	40.9836	37.7049	34.4262
7	45.6140	45.9016	45.9016	44.2623
8	126.316	126.230	127.869	129.508
9	82.4561	81.9672	81.9672	80.3279
10	59.6491	57.3770	57.3770	57.3770
11	71.9298	73.7705	83.6066	95.0820
12	261.404	263.934	272.131	278.689
13	280.702	281.967	263.934	368.852
14	77.1930	80.3279	88.5246	77.0492
15	185.965	177.049	175.410	173.770
16	96.4912	93.4426	91.8033	90.1639
17	70.1754	70.4918	68.8525	67.2131
18	63.1579	59.0164	59.0164	57.3770
19	115.789	116.393	118.033	119.672
20	100.000	98.3607	100.000	95.0820
21	100.000	100.000	100.000	100.000

ENTRY	R67 27	R68 28	R69 29	R70 30
1	109.091	110.294	104.167	101.266
2	157.576	163.235	166.667	164.557
3	87.8788	97.0588	116.667	117.722
4	80.3030	80.8824	81.9444	82.2785
5	30.3030	29.4118	29.1667	29.1139
6	31.8182	32.3529	38.8889	45.5696
7	43.9394	41.1765	43.0556	44.3038
8	128.788	129.412	134.722	143.038
9	77.2727	76.4706	72.2222	63.2911
10	[illegible]	[illegible]	[illegible]	[illegible]

13	518.182	411.765	411.111	373.418
14	56.0606	66.1765	72.2222	75.9494
15	172.727	172.059	172.222	169.620
16	89.3939	89.7059	80.5556	78.4810
17	65.1515	66.1765	69.4444	67.0886
18	57.5758	57.3529	58.3333	56.9620
19	116.667	117.647	113.889	110.127
20	92.4242	89.7059	91.6667	88.6076
21	100.000	100.000	100.000	100.000

ENTRY	R71 31	R72 32	R73 33	R74 34
1	108.046	107.216	110.000	110.680
2	190.805	198.969	215.000	223.301
3	128.736	121.649	119.000	91.2621
4	85.0575	83.5052	82.0000	81.5534
5	28.7356	28.8660	30.0000	30.0971
6	44.8276	32.9897	34.0000	40.7767
7	45.9770	47.4227	48.0000	49.5146
8	125.287	111.340	107.000	116.505
9	71.2644	77.3196	83.0000	72.8155
10	66.6667	59.7938	64.0000	67.9612
11	121.839	116.495	110.000	106.796
12	283.908	274.227	275.000	279.612
13	594.253	552.577	296.000	263.107
14	63.2184	70.1031	107.000	112.621
15	165.517	172.165	173.000	180.583
16	79.3103	77.3196	76.0000	73.7864
17	67.8161	70.1031	70.0000	68.9320
18	59.7701	58.7629	60.0000	58.2524
19	102.299	97.9381	95.0000	94.1748
20	91.9540	90.7216	91.0000	90.2913
21	100.000	100.000	100.000	100.000

ENTRY	R75 35	R76 36	R77 37	R78 38
1	110.476	107.143	110.526	111.966
2	212.381	203.571	207.018	219.658
3	106.667	122.321	117.544	99.1453
4	86.6667	87.5000	86.8421	88.0342
5	29.5238	28.5714	28.9474	29.9145
6	41.9048	37.5000	39.4737	45.2991
7	50.4762	49.1071	50.8772	51.2821
8	111.429	110.714	115.789	118.803
9	74.2857	75.0000	75.4386	73.5043
10	67.6190	73.2143	62.2807	61.5385
11	113.333	114.286	116.667	117.949
12	275.238	270.536	264.035	261.538
13	403.810	411.607	328.947	389.744
14	96.1905	98.2143	112.281	95.7265
15	179.048	189.286	186.842	194.017
16	74.2857	75.0000	72.8070	71.7949
17	67.6190	66.9643	68.4211	68.3761
18	59.0476	60.7143	58.7719	58.9744
19	90.4762	86.6071	85.9649	85.4701
20	91.4286	85.7143	85.0877	84.6154
21	100.000	100.000	100.000	100.000

ENTRY	R79 39	R80 40	R81 41	R82 42
1	113.115	111.290	100.000	98.5816
2	216.393	211.290	199.242	186.525
3	122.951	126.613	142.424	182.270
4	86.8852	90.3226	118.182	117.730
5	30.3279	32.2581	31.0606	31.2057
6	38.5246	51.6129	46.9697	39.7163
7	53.2787	51.6129	53.0303	54.6099
8	122.951	116.935	106.061	119.149
9	69.6721	70.1613	69.6970	64.5390
10	[illegible]	[illegible]	[illegible]	[illegible]

13	407.377	480.645	468.182	562.411
14	92.6230	79.8387	58.3333	81.5603
15	194.262	200.806	263.636	268.794
16	72.9508	71.7742	79.5455	77.3050
17	69.6721	71.7742	59.8485	60.2837
18	58.1967	55.6452	55.3030	54.6099
19	86.0656	86.2903	93.1818	96.4539
20	84.4262	90.3226	81.8182	78.7234
21	100.000	100.000	100.000	100.000

ENTRY	R83 43	R84 44
1	97.9866	97.3856
2	193.289	192.810
3	187.919	203.922
4	117.450	115.033
5	30.8725	30.0654
6	35.5705	35.9477
7	51.0067	49.6732
8	116.107	108.497
9	65.7718	69.2810
10	29.5302	32.0261
11	115.436	115.033
12	261.074	256.863
13	285.235	287.582
14	100.671	100.000
15	283.893	292.157
16	77.8523	75.8170
17	61.0738	62.0915
18	53.6913	52.9412
19	96.6443	102.614
20	77.1812	81.0458
21	100.000	100.000

open output con

```
RATSSM Version 2.02.  08/11/86
  Copyright (C) 1986,1985,1984 by VAR Econometrics
open data b:cintenss
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 GC63 GC64 GC65 GC66 GC67 GC68 GC69 GC70 GC71 GC72 GC73 $
GC74 GC75 GC76 GC77 GC78 $
GC79 GC80 GC81 GC82 GC83 GC84


set GPGR68 1963,1 1963,21 = ((GC68(t)/GC63(t))-1)*100
set GPGR74 1963,1 1963,21 = ((GC74(t)/GC68(t))-1)*100
set GPGR78 1963,1 1963,21 = ((GC78(t)/GC74(t))-1)*100
set GPGR84 1963,1 1963,21 = ((GC84(t)/GC78(t))-1)*100
set GPGR894 1963,1 1963,21 = ((GC84(t)/GC63(t))-1)*100
print 1963,1 1963,21 GPGR68 GPGR74 GPGR78 GPGR84 GPGR894
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ENTRY	GPGR68 23	GPGR74 24	GPGR78 25	GPGR84 26
1	17.1875	52.0000	14.9123	13.7405
2	37.0370	107.207	11.7391	14.7860
3	53.4884	42.4242	23.4043	168.966
4	22.2222	52.7273	22.6190	70.8738
5	17.6471	55.0000	12.9032	31.4286
6	-15.3846	90.9091	26.1905	3.77358
7	7.69231	82.1429	17.6471	26.6667
8	22.2222	36.3636	15.8333	19.4245
9	10.6383	44.2308	14.6667	23.2558
10	8.82353	89.1892	2.85714	-31.9444
11	78.0488	50.6849	25.4545	27.5362
12	32.2148	46.1929	6.25000	28.4314
13	75.0000	-3.21429	68.2657	-3.50877
14	2.27273	157.778	-3.44828	36.6071
15	10.3774	58.9744	22.0430	96.9163
16	10.9091	24.5902	10.5263	38.0952
17	12.5000	57.7778	12.6761	18.7500
18	8.33333	53.8462	15.0000	17.3913
19	21.2121	21.2500	3.09278	57.0000
20	7.01754	52.4590	6.45161	25.2525
21	19.2982	51.4706	13.5922	30.7692

ENTRY	GPGR894 27
1	132.813
2	264.198
3	625.581
4	291.111
5	170.588
6	111.538
7	192.308
8	130.556
9	125.532
10	44.1176
11	329.268
12	163.758
13	175.000
14	247.727
15	321.698
16	110.909
17	137.500
18	125.000
19	137.879
20	117.544
21	168.421

end

NORMAL COMPLETION OF JOB

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cal 1963 1 1
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data 1963,1 1963,21 GR68 UK68 GR74 UK74 GR78 UK78 GR84 UK84 GR894 UK894
print 1963,1 1963,21 GR68 UK68 GR74 UK74 GR78 UK78 GR84 UK84 GR894 UK894
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ENTRY	GR68 1	UK68 2	GR74 3	UK74 4
1	29.0000	17.0000	79.0000	52.0000
2	50.0000	37.0000	101.000	107.000
3	197.000	53.0000	37.0000	42.0000
4	60.0000	22.0000	85.0000	53.0000
5	121.000	18.0000	333.000	55.0000
6	436.000	-15.0000	186.000	91.0000
7	125.000	8.00000	174.000	82.0000
8	75.0000	22.0000	47.0000	36.0000
9	346.000	11.0000	120.000	44.0000
10	49.0000	9.00000	-5.00000	89.0000
11	91.0000	78.0000	37.0000	51.0000
12	96.0000	32.0000	-5.00000	46.0000
13	1136.00	75.0000	153.000	-3.00000
14	111.000	2.00000	101.000	158.000
15	182.000	10.0000	-27.0000	59.0000
16	214.000	11.0000	74.0000	25.0000
17	162.000	12.0000	52.0000	58.0000
18	62.0000	8.00000	114.000	54.0000
19	68.0000	21.0000	65.0000	21.0000
20	51.0000	7.00000	136.000	52.0000
21	121.000	19.0000	63.0000	51.0000

ENTRY	GR78 5	UK78 6	GR84 7	UK84 8
1	67.0000	15.0000	-5.00000	14.0000
2	41.0000	12.0000	5.00000	15.0000
3	41.0000	23.0000	3.00000	169.000
4	48.0000	23.0000	-13.0000	71.0000
5	79.0000	13.0000	.400000	31.0000
6	20.0000	26.0000	-1.00000	4.00000
7	45.0000	18.0000	-13.0000	27.0000
8	31.0000	16.0000	-18.0000	19.0000
9	29.0000	15.0000	28.0000	23.0000
10	28.0000	3.00000	-3.00000	-32.0000
11	41.0000	25.0000	-3.00000	27.0000
12	-4.00000	6.00000	2.00000	28.0000
13	-31.0000	68.0000	-4.00000	-3.00000
14	50.0000	-3.00000	11.0000	37.0000
15	3.00000	22.0000	19.0000	97.0000
16	40.0000	10.0000	26.0000	38.0000
17	72.0000	13.0000	-33.0000	19.0000
18	42.0000	15.0000	-30.0000	17.0000
19	45.0000	3.00000	22.0000	57.0000
20	162.000	6.00000	-11.0000	25.0000
21	28.0000	14.0000	2.00000	31.0000

ENTRY	GR894 9	UK894 10
1	268.000	133.000
2	350.000	264.000
3	492.000	626.000
4	280.000	291.000
5	1620.00	171.000
6	1724.00	111.000
7	681.000	192.000
8	176.000	131.000
9	1525.00	125.000
10	76.0000	44.0000
11	257.000	329.000
12	83.0000	164.000

```
      15        152.000            322.000
      16        863.000            111.000
      17        357.000            137.000
      18        244.000            125.000
      19        393.000            138.000
      20        734.000            117.000
      21        371.000            168.000


cmoment(print,corr) 63,1 63,21
# GR68 UK68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    1      GR68
VAR    2      UK68

CORRELATION MATRIX
    VARIABLE              GR68          UK68
          SERIES LAG      1    0         2    0
    GR68       1    0    1.0000        .37065
    UK68       2    0    .37065        1.0000


cmoment(print,corr) 63,1 63,21
# GR74 UK74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    3      GR74
VAR    4      UK74

CORRELATION MATRIX
    VARIABLE              GR74          UK74
          SERIES LAG      3    0         4    0
    GR74       3    0    1.0000        .64502E-01
    UK74       4    0    .64502E-01    1.0000


cmoment(print,corr) 63,1 63,21
# GR78 UK78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    5      GR78
VAR    6      UK78

CORRELATION MATRIX
    VARIABLE              GR78          UK78
          SERIES LAG      5    0         6    0
    GR78       5    0    1.0000       -.48930
    UK78       6    0   -.48930        1.0000


cmoment(print,corr) 63,1 63,21
# GR84 UK84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    7      GR84
VAR    8      UK84

CORRELATION MATRIX
    VARIABLE              GR84          UK84
          SERIES LAG      7    0         8    0
    GR84       7    0    1.0000        [illegible]
```

```
cmoment(print,corr) 63,1 63,21
# GR894 UK894

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     9      GR894
VAR    10      UK894

CORRELATION MATRIX
    VARIABLE              GR894          UK894
          SERIES LAG      9    0         10    0
    GR894       9    0   1.0000        -.16863
    UK894      10    0  -.16863         1.0000


end

         NORMAL COMPLETION OF JOB
                   HALT AT     0
                       0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:teliko
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 GCP68 UCP68 GCP74 UCP74 GCP78 UCP78 GCP84 UCP84 GCP94 $
UCP94 GLP68 ULP68 GLP74 ULP74 GLP78 ULP78 GLP84 ULP84 GLP94 ULP94 GGP68 UGP68
GGP74 UGP74 GGP78 UGP78 GGP84 UGP84 GGP94 UGP94 GST68 UST68 GST74 UST74 GST78
UST78 GST84 UST84 GST94 UST94 GLA68 ULA68 GLA74 ULA74 GLA78 ULA78 GLA84 ULA84
GLA94 ULA94
print 1963,1 1963,21 GCP68 UCP68 GCP74 UCP74 GCP78 UCP78 GCP84 UCP84 GCP94 $
UCP94 GLP68 ULP68 GLP74 ULP74 GLP78 ULP78 GLP84 ULP84 GLP94 ULP94 GGP68 UGP68
GGP74 UGP74 GGP78 UGP78 GGP84 UGP84 GGP94 UGP94 GST68 UST68 GST74 UST74 GST78
UST78 GST84 UST84 GST94 UST94 GLA68 ULA68 GLA74 ULA74 GLA78 ULA78 GLA84 ULA84
GLA94 ULA94
```

ENTRY	GCP68 1	UCP68 2	GCP74 3	UCP74 4
1	13.0000	-3.00000	-27.0000	-7.00000
2	15.0000	-12.0000	-4.00000	-43.0000
3	-49.0000	-35.0000	-18.0000	-37.0000
4	8.00000	-.300000	-19.0000	-24.0000
5	-36.0000	-8.00000	-65.0000	-14.0000
6	-71.0000	481.000	-48.0000	-8.00000
7	-11.0000	-57.0000	-57.0000	-26.0000
8	-20.0000	7.00000	13.0000	-15.0000
9	-69.0000	5.00000	-30.0000	-24.0000
10	11.0000	4.00000	23.0000	-26.0000
11	-21.0000	-32.0000	25.0000	-27.0000
12	-17.0000	-16.0000	71.0000	-21.0000
13	-90.0000	-17.0000	-66.0000	75.0000
14	-18.0000	.500000	-26.0000	-49.0000
15	-17.0000	-13.0000	127.000	-9.00000
16	-52.0000	-.200000	-16.0000	-12.0000
17	-45.0000	9.00000	-14.0000	-27.0000
18	-11.0000	-5.00000	-47.0000	-20.0000
19	-30.0000	-6.00000	3.00000	-3.00000
20	22.0000	8.00000	-26.0000	-20.0000
21	-29.0000	-5.00000	-9.00000	-19.0000

ENTRY	GCP78 5	UCP78 6	GCP84 7	UCP84 8
1	-14.0000	4.00000	-6.00000	7.00000
2	11.0000	10.0000	-5.00000	-12.0000
3	-13.0000	-3.00000	-24.0000	-45.0000
4	-19.0000	-14.0000	24.0000	-33.0000
5	-42.0000	-2.00000	-13.0000	-5.00000
6	-.200000	-23.0000	-16.0000	-12.0000
7	-31.0000	5.00000	-47.0000	-19.0000
8	-45.0000	-8.00000	59.0000	12.0000
9	-6.00000	7.00000	18.0000	-2.00000
10	-57.0000	-3.50000	-26.0000	159.000
11	-25.0000	-5.00000	-3.00000	8.00000
12	2.00000	7.00000	-.200000	11.0000
13	16.0000	-16.0000	3.00000	128.000
14	-8.00000	32.0000	-4.00000	-57.0000
15	-13.0000	-31.0000	-6.00000	-37.0000
16	-27.0000	.900000	.400000	-18.0000
17	-41.0000	7.00000	-24.0000	-7.00000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

21	-14.0000	-1.00000	-5.00000	-6.00000

ENTRY	GCP94 9	UCP94 10	GLP68 11	ULP68 12
1	-33.0000	.600000	46.0000	15.0000
2	16.0000	-51.0000	73.0000	20.0000
3	-72.0000	-78.0000	50.0000	-.600000
4	-13.0000	-56.0000	72.0000	22.0000
5	-88.0000	-26.0000	42.0000	12.0000
6	-87.0000	261.000	56.0000	402.000
7	-86.0000	-73.0000	99.0000	-53.0000
8	-20.0000	-7.00000	41.0000	30.0000
9	-75.0000	-16.0000	40.0000	17.0000
10	-56.0000	93.0000	66.0000	14.0000
11	-28.0000	-49.0000	51.0000	20.0000
12	44.0000	-21.0000	63.0000	11.0000
13	-96.0000	178.000	20.0000	45.0000
14	-47.0000	-71.0000	73.0000	.900000
15	55.0000	-66.0000	135.000	-4.00000
16	-71.0000	-28.0000	50.0000	9.00000
17	-79.0000	-21.0000	43.0000	23.0000
18	-57.0000	-20.0000	45.0000	5.00000
19	-68.0000	-27.0000	17.0000	13.0000
20	-54.0000	-3.00000	85.0000	15.0000
21	-47.0000	-29.0000	58.0000	13.0000

ENTRY	GLP74 13	ULP74 14	GLP78 15	ULP78 16
1	31.0000	40.0000	45.0000	20.0000
2	93.0000	19.0000	57.0000	23.0000
3	13.0000	-10.0000	23.0000	19.0000
4	50.0000	16.0000	19.0000	5.00000
5	54.0000	33.0000	4.00000	10.0000
6	48.0000	76.0000	20.0000	-4.00000
7	18.0000	34.0000	.500000	23.0000
8	66.0000	16.0000	-28.0000	7.00000
9	55.0000	9.00000	21.0000	23.0000
10	17.0000	41.0000	-45.0000	-.600000
11	72.0000	10.0000	6.00000	19.0000
12	61.0000	15.0000	-2.00000	14.0000
13	-15.0000	70.0000	-21.0000	42.0000
14	48.0000	34.0000	38.0000	27.0000
15	65.0000	44.0000	-11.0000	-16.0000
16	46.0000	10.0000	1.00000	12.0000
17	30.0000	16.0000	2.00000	20.0000
18	14.0000	22.0000	-8.00000	17.0000
19	70.0000	18.0000	-14.0000	6.00000
20	74.0000	23.0000	49.0000	8.00000
21	49.0000	22.0000	10.0000	13.0000

ENTRY	GLP84 17	ULP84 18	GLP94 19	ULP94 20
1	-11.0000	21.0000	145.000	136.000
2	-.200000E-01	1.00000	423.000	78.0000
3	-22.0000	47.0000	63.0000	58.0000
4	8.00000	14.0000	231.000	70.0000
5	-13.0000	23.0000	98.0000	102.000
6	-17.0000	-8.00000	129.000	678.000
7	-54.0000	3.00000	8.00000	-20.0000
8	31.0000	33.0000	120.000	115.000
9	51.0000	21.0000	298.000	90.0000
10	-28.0000	75.0000	-23.0000	178.000
11	-6.00000	39.0000	158.000	116.000
12	2.00000	43.0000	164.000	108.000
13	-1.00000	120.000	-20.0000	667.000
14	7.00000	-42.0000	280.000	-.800000
15	12.0000	23.0000	289.000	43.0000
16	26.0000	13.0000	181.000	51.0000
17	-49.0000	10.0000	-3.00000	88.0000
18	[illegible]	[illegible]	[illegible]	[illegible]

21	3.00000	22.0000	150.000	90.0000

ENTRY	GGP68 21	UGP68 22	GGP74 23	UGP74 24
1	46.0000	16.0000	49.0000	29.0000
2	102.000	19.0000	82.0000	-1.10000
3	12.0000	-4.70000	-12.0000	-21.0000
4	70.0000	8.40000	89.0000	-9.60000
5	44.0000	1.20000	48.0000	8.40000
6	54.0000	435.000	78.0000	35.0000
7	123.000	-45.0000	30.0000	17.0000
8	82.0000	27.0000	67.0000	14.0000
9	46.0000	24.0000	71.0000	-5.10000
10	55.0000	3.30000	39.0000	4.20000
11	99.0000	41.0000	157.000	16.0000
12	104.000	8.10000	121.000	11.0000
13	53.0000	48.0000	80.0000	15.0000
14	80.0000	5.00000	67.0000	11.0000
15	297.000	-6.20000	196.000	24.0000
16	50.0000	13.0000	87.0000	9.90000
17	64.0000	31.0000	81.0000	-7.30000
18	105.000	15.0000	80.0000	11.0000
19	15.0000	3.60000	212.000	12.0000
20	99.0000	24.0000	119.000	7.50000
21	64.0000	13.0000	81.0000	8.00000

ENTRY	GGP78 25	UGP78 26	GGP84 27	UGP84 28
1	45.0000	9.90000	-5.90000	13.0000
2	56.0000	17.0000	10.0000	-15.0000
3	35.0000	11.0000	-18.0000	-11.0000
4	33.0000	-12.0000	-9.60000	-44.0000
5	33.0000	-2.60000	-1.50000	-6.30000
6	29.0000	-9.10000	-16.0000	-21.0000
7	28.0000	11.0000	-53.0000	-18.0000
8	-4.30000	-7.10000	29.0000	-2.00000
9	35.0000	17.0000	56.0000	21.0000
10	-18.0000	-12.0000	-21.0000	10.0000
11	33.0000	7.50000	-2.10000	7.70000
12	19.0000	15.0000	8.70000	13.0000
13	-5.00000	42.0000	22.0000	114.000
14	43.0000	12.0000	6.60000	-57.0000
15	-1.80000	-24.0000	29.0000	-44.0000
16	11.0000	3.90000	23.0000	-20.0000
17	12.0000	14.0000	-43.0000	-1.70000
18	-1.20000	4.80000	-7.20000	6.00000
19	15.0000	1.10000	11.0000	-21.0000
20	51.0000	2.80000	-13.0000	1.20000
21	25.0000	4.00000	1.00000	-7.00000

ENTRY	GGP94 29	UGP94 30	GST68 31	UST68 32
1	195.000	85.0000	29.0000	20.0000
2	536.000	17.0000	76.0000	35.0000
3	8.40000	-26.0000	121.000	46.0000
4	288.000	-51.0000	58.0000	9.00000
5	179.000	.150000	124.000	10.0000
6	197.000	418.000	431.000	-8.00000
7	73.0000	-42.0000	152.000	27.0000
8	275.000	31.0000	126.000	19.0000
9	427.000	66.0000	365.000	18.0000
10	39.0000	4.40000	39.0000	-.900000
11	564.000	89.0000	151.000	110.000
12	482.000	55.0000	146.000	28.0000
13	218.000	416.000	1467.00	78.0000
14	359.000	-43.0000	120.000	4.00000
15	1393.00	-50.0000	376.000	7.00000
16	283.000	3.20000	213.000	13.0000
17	89.0000	36.0000	201.000	20.0000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

21	274.000	18.0000	130.000	19.0000

ENTRY	GST74 33	UST74 34	GST78 35	UST78 36
1	105.000	38.0000	67.0000	5.00000
2	90.0000	73.0000	41.0000	6.00000
3	7.00000	25.0000	54.0000	14.0000
4	135.000	18.0000	65.0000	3.00000
5	316.000	25.0000	129.000	-.400000
6	245.000	47.0000	29.0000	18.0000
7	202.000	57.0000	84.0000	5.00000
8	48.0000	35.0000	73.0000	.800000
9	144.000	25.0000	44.0000	9.00000
10	13.0000	41.0000	89.0000	-9.00000
11	106.000	58.0000	76.0000	13.0000
12	29.0000	41.0000	17.0000	7.00000
13	435.000	-34.0000	-18.0000	68.0000
14	127.000	117.000	56.0000	-15.0000
15	30.0000	36.0000	13.0000	10.0000
16	123.000	25.0000	54.0000	3.00000
17	110.000	27.0000	89.0000	7.00000
18	237.000	39.0000	53.0000	4.00000
19	203.000	15.0000	94.0000	-1.00000
20	197.000	33.0000	165.000	1.00000
21	98.0000	33.0000	46.0000	5.00000

ENTRY	GST84 37	UST84 38	GST94 39	UST94 40
1	.400000	6.00000	343.000	84.0000
2	16.0000	-3.00000	447.000	138.000
3	8.00000	63.0000	295.000	239.000
4	-27.0000	-15.0000	346.000	12.0000
5	14.0000	-1.00000	2326.00	36.0000
6	.300000	-10.0000	2265.00	43.0000
7	-11.0000	1.00000	1146.00	114.000
8	-19.0000	-12.0000	370.000	41.0000
9	32.0000	24.0000	2056.00	98.0000
10	7.00000	-57.0000	218.000	-46.0000
11	.800000	-.400000	818.000	273.000
12	9.00000	1.00000	303.000	97.0000
13	18.0000	-6.00000	8017.00	85.0000
14	11.0000	2.00000	760.000	96.0000
15	37.0000	-10.0000	864.000	46.0000
16	22.0000	-2.00000	1216.00	43.0000
17	-25.0000	6.00000	789.000	72.0000
18	-33.0000	1.00000	689.000	77.0000
19	47.0000	.900000	1344.00	27.0000
20	-3.00000	-8.00000	1141.00	42.0000
21	6.00000	-.600000	606.000	66.0000

ENTRY	GLA68 41	ULA68 42	GLA74 43	ULA74 44
1	-.100000	.900000	14.0000	-8.00000
2	17.0000	-1.00000	-6.00000	-17.0000
3	-26.0000	-4.00000	-22.0000	-13.0000
4	-.900000	-11.0000	27.0000	-22.0000
5	1.50000	-9.00000	-4.00000	-18.0000
6	-1.00000	7.00000	20.0000	-23.0000
7	12.0000	15.0000	10.0000	-13.0000
8	29.0000	-2.50000	.900000	-2.00000
9	4.00000	6.00000	11.0000	-13.0000
10	-6.00000	-9.00000	19.0000	-26.0000
11	32.0000	18.0000	50.0000	5.00000
12	25.0000	-3.00000	37.0000	-3.00000
13	27.0000	2.00000	111.000	-32.0000
14	4.00000	4.00000	13.0000	-17.0000
15	69.0000	-2.00000	80.0000	-14.0000
16	-.300000	4.00000	28.0000	.000000
17	15.0000	7.00000	38.0000	-20.0000
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

21	4.00000	.400000	21.0000	-12.0000

ENTRY	GLA78 45	ULA78 46	GLA84 47	ULA84 48
1	-.100000	-9.00000	6.00000	-7.00000
2	-.500000	-5.00000	10.0000	-16.0000
3	9.00000	-7.00000	5.00000	-39.0000
4	12.0000	-16.0000	-16.0000	-50.0000
5	28.0000	-11.0000	13.0000	-24.0000
6	7.00000	-5.00000	1.00000	-14.0000
7	27.0000	-10.0000	2.00000	-20.0000
8	33.0000	-13.0000	-1.00000	-27.0000
9	12.0000	-5.00000	3.00000	.600000
10	48.0000	-12.0000	10.0000	-37.0000
11	25.0000	-9.00000	4.00000	-22.0000
12	21.0000	1.00000	6.00000	-21.0000
13	20.0000	.000000	23.0000	-2.50000
14	4.00000	-12.0000	-.600000	-25.0000
15	9.80000	-9.00000	15.0000	-54.0000
16	9.70000	-7.00000	-3.00000	-29.0000
17	9.60000	-5.00000	12.0000	-11.0000
18	8.00000	-10.0000	-4.00000	-13.0000
19	34.0000	-4.00000	20.0000	-36.0000
20	1.00000	-5.00000	9.00000	-27.0000
21	14.0000	-8.00000	4.00000	-24.0000

ENTRY	GLA94 49	ULA94 50
1	20.0000	-21.0000
2	21.0000	-34.0000
3	-33.0000	-53.0000
4	17.0000	-71.0000
5	41.0000	-50.0000
6	30.0000	-33.0000
7	59.0000	-28.0000
8	70.0000	-39.0000
9	33.0000	-13.0000
10	81.0000	-62.0000
11	157.000	-12.0000
12	121.000	-25.0000
13	296.000	-33.0000
14	21.0000	-43.0000
15	283.000	-65.0000
16	37.0000	-32.0000
17	94.0000	-27.0000
18	129.000	-22.0000
19	193.000	-47.0000
20	49.0000	-35.0000
21	50.0000	-38.0000

```
cmoment(print,corr) 63,1 63,21
# GCP68 UCP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     1      GCP68
VAR     2      UCP68

CORRELATION MATRIX
    VARIABLE              GCP68          UCP68
          SERIES LAG      1   0          2   0
    GCP68        1   0    1.0000        -.33297
    UCP68        2   0   -.33297         1.0000


cmoment(print,corr) 63,1 63,21
# GCP74 UCP74
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR    3      GCP74
VAR    4      UCP74

CORRELATION MATRIX
    VARIABLE             GCP74          UCP74
          SERIES LAG      3   0          4   0
    GCP74        3   0   1.0000        -.19166
    UCP74        4   0  -.19166         1.0000


cmoment(print,corr) 63,1 63,21
# GCP78 UCP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    5      GCP78
VAR    6      UCP78

CORRELATION MATRIX
    VARIABLE             GCP78          UCP78
          SERIES LAG      5   0          6   0
    GCP78        5   0   1.0000        -.49375E-01
    UCP78        6   0  -.49375E-01     1.0000


cmoment(print,corr) 63,1 63,21
# GCP84 UCP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    7      GCP84
VAR    8      UCP84

CORRELATION MATRIX
    VARIABLE             GCP84          UCP84
          SERIES LAG      7   0          8   0
    GCP84        7   0   1.0000        -.71007E-02
    UCP84        8   0  -.71007E-02     1.0000


cmoment(print,corr) 63,1 63,21
# GCP94 UCP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    9      GCP94
VAR   10      UCP94

CORRELATION MATRIX
    VARIABLE             GCP94          UCP94
          SERIES LAG      9   0         10   0
    GCP94        9   0   1.0000        -.36877
    UCP94       10   0  -.36877         1.0000


cmoment(print,corr) 63,1 63,21
# GLP68 ULP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   11      GLP68
VAR   12      ULP68

CORRELATION MATRIX
```

```
    ULP68        12    0   -.13873          1.0000


cmoment(print,corr) 63,1 63,21
# GLP74 ULP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   13      GLP74
VAR   14      ULP74

CORRELATION MATRIX
    VARIABLE               GLP74          ULP74
          SERIES LAG    13    0          14    0
    GLP74       13   0    1.0000        -.30441
    ULP74       14   0   -.30441         1.0000


cmoment(print,corr) 63,1 63,21
# GLP78 ULP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   15      GLP78
VAR   16      ULP78

CORRELATION MATRIX
    VARIABLE               GLP78          ULP78
          SERIES LAG    15    0          16    0
    GLP78       15   0    1.0000         .23831
    ULP78       16   0    .23831         1.0000


cmoment(print,corr) 63,1 63,21
# GLP84 ULP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   17      GLP84
VAR   18      ULP84

CORRELATION MATRIX
    VARIABLE               GLP84          ULP84
          SERIES LAG    17    0          18    0
    GLP84       17   0    1.0000        -.31907E-01
    ULP84       18   0   -.31907E-01    1.0000


cmoment(print,corr) 63,1 63,21
# GLP94 ULP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   19      GLP94
VAR   20      ULP94

CORRELATION MATRIX
    VARIABLE               GLP94          ULP94
          SERIES LAG    19    0          20    0
    GLP94       19   0    1.0000        -.28068
    ULP94       20   0   -.28068         1.0000


cmoment(print,corr) 63,1 63,21
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR    1      GCP68
VAR   21      GGP68

CORRELATION MATRIX
    VARIABLE              GCP68         GGP68
          SERIES LAG      1    0        21    0
    GCP68       1    0    1.0000        .29035
    GGP68      21    0    .29035        1.0000


cmoment(print,corr) 63,1 63,21
# GCP74 GGP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    3      GCP74
VAR   23      GGP74

CORRELATION MATRIX
    VARIABLE              GCP74         GGP74
          SERIES LAG      3    0        23    0
    GCP74       3    0    1.0000        .57433
    GGP74      23    0    .57433        1.0000


cmoment(print,corr) 63,1 63,21
# GCP78 GGP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    5      GCP78
VAR   25      GGP78

CORRELATION MATRIX
    VARIABLE              GCP78         GGP78
          SERIES LAG      5    0        25    0
    GCP78       5    0    1.0000        .32115
    GGP78      25    0    .32115        1.0000


cmoment(print,corr) 63,1 63,21
# GCP84 GGP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    7      GCP84
VAR   27      GGP84

CORRELATION MATRIX
    VARIABLE              GCP84         GGP84
          SERIES LAG      7    0        27    0
    GCP84       7    0    1.0000        .58180
    GGP84      27    0    .58180        1.0000


cmoment(print,corr) 63,1 63,21
# GCP94 GGP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    9      GCP94
VAR   29      GGP94

CORRELATION MATRIX
    VARIABLE              GCP94         GGP94
```

```
    GGP94      29    0    .72296         1.0000


cmoment(print,corr) 63,1 63,21
# UCP68 UGP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    2       UCP68
VAR   22       UGP68

CORRELATION MATRIX
    VARIABLE               UCP68          UGP68
          SERIES LAG     2    0          22    0
    UCP68        2    0    1.0000         .98328
    UGP68       22    0    .98328         1.0000


cmoment(print,corr) 63,1 63,21
# UCP74 UGP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    4       UCP74
VAR   24       UGP74

CORRELATION MATRIX
    VARIABLE               UCP74          UGP74
          SERIES LAG     4    0          24    0
    UCP74        4    0    1.0000         .36180
    UGP74       24    0    .36180         1.0000


cmoment(print,corr) 63,1 63,21
# UCP78 UGP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    6       UCP78
VAR   26       UGP78

CORRELATION MATRIX
    VARIABLE               UCP78          UGP78
          SERIES LAG     6    0          26    0
    UCP78        6    0    1.0000         .45011
    UGP78       26    0    .45011         1.0000


cmoment(print,corr) 63,1 63,21
# UCP84 UGP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    8       UCP84
VAR   28       UGP84

CORRELATION MATRIX
    VARIABLE               UCP84          UGP84
          SERIES LAG     8    0          28    0
    UCP84        8    0    1.0000         .73713
    UGP84       28    0    .73713         1.0000


cmoment(print,corr) 63,1 63,21
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR    10      UCP94
VAR    30      UGP94

CORRELATION MATRIX
    VARIABLE               UCP94          UGP94
          SERIES LAG    10    0        30    0
    UCP94      10    0   1.0000         .89954
    UGP94      30    0   .89954         1.0000


cmoment(print,corr) 63,1 63,21
# GLP68 GGP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    11      GLP68
VAR    21      GGP68

CORRELATION MATRIX
    VARIABLE               GLP68          GGP68
          SERIES LAG    11    0        21    0
    GLP68      11    0   1.0000         .81964
    GGP68      21    0   .81964         1.0000


cmoment(print,corr) 63,1 63,21
# GLP74 GGP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    13      GLP74
VAR    23      GGP74

CORRELATION MATRIX
    VARIABLE               GLP74          GGP74
          SERIES LAG    13    0        23    0
    GLP74      13    0   1.0000         .54666
    GGP74      23    0   .54666         1.0000


cmoment(print,corr) 63,1 63,21
# GLP78 GGP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    15      GLP78
VAR    25      GGP78

CORRELATION MATRIX
    VARIABLE               GLP78          GGP78
          SERIES LAG    15    0        25    0
    GLP78      15    0   1.0000         .93939
    GGP78      25    0   .93939         1.0000


cmoment(print,corr) 63,1 63,21
# GLP84 GGP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    17      GLP84
VAR    27      GGP84

CORRELATION MATRIX
    VARIABLE               GLP84          GGP84
```

```
    GGP94       27    0    .93683          1.0000


cmoment(print,corr) 63,1 63,21
# GLP94 GGP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    19       GLP94
VAR    29       GGP94

CORRELATION MATRIX
    VARIABLE                GLP94          GGP94
          SERIES LAG    19    0        29    0
    GLP94       19    0    1.0000         .61502
    GGP94       29    0    .61502         1.0000


cmoment(print,corr) 63,1 63,21
# ULP68 UGP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    12       ULP68
VAR    22       UGP68

CORRELATION MATRIX
    VARIABLE                ULP68          UGP68
          SERIES LAG    12    0        22    0
    ULP68       12    0    1.0000         .99585
    UGP68       22    0    .99585         1.0000


cmoment(print,corr) 63,1 63,21
# ULP74 UGP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    14       ULP74
VAR    24       UGP74

CORRELATION MATRIX
    VARIABLE                ULP74          UGP74
          SERIES LAG    14    0        24    0
    ULP74       14    0    1.0000         .70269
    UGP74       24    0    .70269         1.0000


cmoment(print,corr) 63,1 63,21
# ULP78 UGP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    16       ULP78
VAR    26       UGP78

CORRELATION MATRIX
    VARIABLE                ULP78          UGP78
          SERIES LAG    16    0        26    0
    ULP78       16    0    1.0000         .94461
    UGP78       26    0    .94461         1.0000


cmoment(print,corr) 63,1 63,21
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR   18      ULP84
VAR   28      UGP84

CORRELATION MATRIX
     VARIABLE              ULP84          UGP84
           SERIES LAG     18    0        28    0
     ULP84      18    0   1.0000         .82101
     UGP84      28    0   .82101         1.0000


cmoment(print,corr) 63,1 63,21
# ULP94 UGP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   20      ULP94
VAR   30      UGP94

CORRELATION MATRIX
     VARIABLE              ULP94          UGP94
           SERIES LAG     20    0        30    0
     ULP94      20    0   1.0000         .96933
     UGP94      30    0   .96933         1.0000


cmoment(print,corr) 63,1 63,21
# GLP68 GCP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   11      GLP68
VAR    1      GCP68

CORRELATION MATRIX
     VARIABLE              GLP68          GCP68
           SERIES LAG     11    0         1    0
     GLP68      11    0   1.0000         .48007
     GCP68       1    0   .48007         1.0000


cmoment(print,corr) 63,1 63,21
# GLP74 GCP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   13      GLP74
VAR    3      GCP74

CORRELATION MATRIX
     VARIABLE              GLP74          GCP74
           SERIES LAG     13    0         3    0
     GLP74      13    0   1.0000         .43261
     GCP74       3    0   .43261         1.0000


cmoment(print,corr) 63,1 63,21
# GLP78 GCP78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   15      GLP78
VAR    5      GCP78

CORRELATION MATRIX
```

```
    GCP78        5    0    .41127         1.0000


cmoment(print,corr) 63,1 63,21
# GLP84 GCP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   17      GLP84
VAR    7      GCP84

CORRELATION MATRIX
    VARIABLE              GLP84          GCP84
          SERIES LAG    17    0          7    0
    GLP84       17    0    1.0000         .73252
    GCP84        7    0    .73252         1.0000


cmoment(print,corr) 63,1 63,21
# GLP94 GCP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   19      GLP94
VAR    9      GCP94

CORRELATION MATRIX
    VARIABLE              GLP94          GCP94
          SERIES LAG    19    0          9    0
    GLP94       19    0    1.0000         .55995
    GCP94        9    0    .55995         1.0000


cmoment(print,corr) 63,1 63,21
# ULP68 UCP68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   12      ULP68
VAR    2      UCP68

CORRELATION MATRIX
    VARIABLE              ULP68          UCP68
          SERIES LAG    12    0          2    0
    ULP68       12    0    1.0000         .98630
    UCP68        2    0    .98630         1.0000


cmoment(print,corr) 63,1 63,21
# ULP74 UCP74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   14      ULP74
VAR    4      UCP74

CORRELATION MATRIX
    VARIABLE              ULP74          UCP74
          SERIES LAG    14    0          4    0
    ULP74       14    0    1.0000         .57691
    UCP74        4    0    .57691         1.0000


cmoment(print,corr) 63,1 63,21
```

```
FROM   1963:   1  UNTIL   1983:   1
VAR    16       ULP78
VAR     6       UCP78

CORRELATION MATRIX
    VARIABLE                ULP78          UCP78
          SERIES LAG     16    0          6    0
    ULP78      16    0   1.0000         .54866
    UCP78       6    0   .54866         1.0000


cmoment(print,corr) 63,1 63,21
# ULP84 UCP84

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR    18       ULP84
VAR     8       UCP84

CORRELATION MATRIX
    VARIABLE                ULP84          UCP84
          SERIES LAG     18    0          8    0
    ULP84      18    0   1.0000         .79169
    UCP84       8    0   .79169         1.0000


cmoment(print,corr) 63,1 63,21
# ULP94 UCP94

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR    20       ULP94
VAR    10       UCP94

CORRELATION MATRIX
    VARIABLE                ULP94          UCP94
          SERIES LAG     20    0         10    0
    ULP94      20    0   1.0000         .94783
    UCP94      10    0   .94783         1.0000


cmoment(print,corr) 63,1 63,21
# GLP68 GLA68

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR    11       GLP68
VAR    41       GLA68

CORRELATION MATRIX
    VARIABLE                GLP68          GLA68
          SERIES LAG     11    0         41    0
    GLP68      11    0   1.0000         .37583
    GLA68      41    0   .37583         1.0000


cmoment(print,corr) 63,1 63,21
# GLP74 GLA74

VARIABLES IN CROSS-MOMENT MATRIX
FROM   1963:   1  UNTIL   1983:   1
VAR    13       GLP74
VAR    43       GLA74

CORRELATION MATRIX
    VARIABLE                GLP74          GLA74
```

```
    GLA74       43    0  -.19271          1.0000


cmoment(print,corr) 63,1 63,21
# GLP78 GLA78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   15       GLP78
VAR   45       GLA78

CORRELATION MATRIX
    VARIABLE              GLP78          GLA78
          SERIES LAG    15    0         45    0
    GLP78       15    0   1.0000        -.81521
    GLA78       45    0  -.81521         1.0000


cmoment(print,corr) 63,1 63,21
# GLP84 GLA84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   17       GLP84
VAR   47       GLA84

CORRELATION MATRIX
    VARIABLE              GLP84          GLA84
          SERIES LAG    17    0         47    0
    GLP84       17    0   1.0000        -.25436
    GLA84       47    0  -.25436         1.0000


cmoment(print,corr) 63,1 63,21
# GLP94 GLA94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   19       GLP94
VAR   49       GLA94

CORRELATION MATRIX
    VARIABLE              GLP94          GLA94
          SERIES LAG    19    0         49    0
    GLP94       19    0   1.0000        -.23929
    GLA94       49    0  -.23929         1.0000


cmoment(print,corr) 63,1 63,21
# GLP68 GST68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   11       GLP68
VAR   31       GST68

CORRELATION MATRIX
    VARIABLE              GLP68          GST68
          SERIES LAG    11    0         31    0
    GLP68       11    0   1.0000        -.24002
    GST68       31    0  -.24002         1.0000


cmoment(print,corr) 63,1 63,21
# GLP74 GST74
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR   13      GLP74
VAR   33      GST74

CORRELATION MATRIX
    VARIABLE            GLP74         GST74
          SERIES LAG    13    0       33    0
    GLP74      13    0  1.0000       -.32873
    GST74      33    0 -.32873        1.0000


cmoment(print,corr) 63,1 63,21
# GLP78 GST78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   15      GLP78
VAR   35      GST78

CORRELATION MATRIX
    VARIABLE            GLP78         GST78
          SERIES LAG    15    0       35    0
    GLP78      15    0  1.0000        .15593
    GST78      35    0   .15593       1.0000


cmoment(print,corr) 63,1 63,21
# GLP84 GST84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   17      GLP84
VAR   37      GST84

CORRELATION MATRIX
    VARIABLE            GLP84         GST84
          SERIES LAG    17    0       37    0
    GLP84      17    0  1.0000        .34436
    GST84      37    0   .34436       1.0000


cmoment(print,corr) 63,1 63,21
# GLP94 GST94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   19      GLP94
VAR   39      GST94

CORRELATION MATRIX
    VARIABLE            GLP94         GST94
          SERIES LAG    19    0       39    0
    GLP94      19    0  1.0000       -.27755
    GST94      39    0 -.27755        1.0000


cmoment(print,corr) 63,1 63,21
# ULP68 ULA68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   12      ULP68
VAR   42      ULA68

CORRELATION MATRIX
    VARIABLE            ULP68         ULA68
```

```
   ULA68       42    0    .98453E-01    1.0000


cmoment(print,corr) 63,1 63,21
# ULP74 ULA74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   14      ULP74
VAR   44      ULA74

CORRELATION MATRIX
    VARIABLE            ULP74          ULA74
          SERIES LAG    14    0        44    0
    ULP74       14    0   1.0000        -.59500
    ULA74       44    0  -.59500         1.0000


cmoment(print,corr) 63,1 63,21
# ULP78 ULA78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   16      ULP78
VAR   46      ULA78

CORRELATION MATRIX
    VARIABLE            ULP78          ULA78
          SERIES LAG    16    0        46    0
    ULP78       16    0   1.0000        .31076
    ULA78       46    0   .31076        1.0000


cmoment(print,corr) 63,1 63,21
# ULP84 ULA84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   18      ULP84
VAR   48      ULA84

CORRELATION MATRIX
    VARIABLE            ULP84          ULA84
          SERIES LAG    18    0        48    0
    ULP84       18    0   1.0000        .63388E-01
    ULA84       48    0   .63388E-01    1.0000


cmoment(print,corr) 63,1 63,21
# ULP94 ULA94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   20      ULP94
VAR   50      ULA94

CORRELATION MATRIX
    VARIABLE            ULP94          ULA94
          SERIES LAG    20    0        50    0
    ULP94       20    0   1.0000        .10291
    ULA94       50    0   .10291        1.0000


cmoment(print,corr) 63,1 63,21
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR   12      ULP68
VAR   32      UST68

CORRELATION MATRIX
     VARIABLE               ULP68          UST68
            SERIES LAG    12    0        32    0
     ULP68       12    0  1.0000        -.22004
     UST68       32    0 -.22004         1.0000


cmoment(print,corr) 63,1 63,21
# ULP74 UST74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   14      ULP74
VAR   34      UST74

CORRELATION MATRIX
     VARIABLE               ULP74          UST74
            SERIES LAG    14    0        34    0
     ULP74       14    0  1.0000        -.10373
     UST74       34    0 -.10373         1.0000


cmoment(print,corr) 63,1 63,21
# ULP78 UST78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   16      ULP78
VAR   36      UST78

CORRELATION MATRIX
     VARIABLE               ULP78          UST78
            SERIES LAG    16    0        36    0
     ULP78       16    0  1.0000         .42147
     UST78       36    0  .42147         1.0000


cmoment(print,corr) 63,1 63,21
# ULP84 UST84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   18      ULP84
VAR   38      UST84

CORRELATION MATRIX
     VARIABLE               ULP84          UST84
            SERIES LAG    18    0        38    0
     ULP84       18    0  1.0000        -.15083
     UST84       38    0 -.15083         1.0000


cmoment(print,corr) 63,1 63,21
# ULP94 UST94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   20      ULP94
VAR   40      UST94

CORRELATION MATRIX
     VARIABLE               ULP94          UST94
```

```
    UST94        40    0   -.12632          1.0000


end


        NORMAL COMPLETION OF JOB
                  HALT AT      0
                     0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:lab
cal 1963 1 1
all 0 1963,22
data 1963,1 1963.22 G1 T1 G2 T2 G3 T3 G4 T4 G5 T5 G6 T6 G7 T7 G8 T8 G9 T9 $
G10 T10 G11 T11 G12 T12 G13 T13 G14 T14 G15 T15 G16 T16 G17 T17 G18 T18 $
G19 T19 G20 T20
print 1963,1 1963,22 G1 T1 G2 T2 G3 T3 G4 T4 G5 T5 G6 T6 G7 T7 G8 T8 G9 T9 $
G10 T10 G11 T11 G12 T12 G13 T13 G14 T14 G15 T15 G16 T16 G17 T17 G18 T18 $
G19 T19 G20 T20

ols G1 1963,1 1963,22
# constant T1


DEPENDENT VARIABLE     1      G1
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .73761016      RBAR**2          .72449067
SSR          31.147702            SEE          1.2479524
DURBIN-WATSON  1.50422970
Q(  11)=    10.7710        SIGNIFICANCE LEVEL  .462841
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
```

[illegible] .3144551 [illegible]

```
ols G2 1963.1 1963.22
# constant T2
```

```
DEPENDENT VARIABLE     3      G2
FROM   1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .37337863      RBAR**2           .34204756
SSR          .45733653          SEE          .15121781
DURBIN-WATSON  1.59352034
Q(  11)=    10.4935          SIGNIFICANCE LEVEL  .486617
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .3836166        .6865606E-01    5.587513
  2      T2          4    0   -.4765596E-01    .1380480E-01   -3.452130
```

```
ols G3 1963.1 1963.22
# constant T3
```

```
DEPENDENT VARIABLE     5      G3
FROM   1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .77066553      RBAR**2           .75919881
SSR          2.1186335          SEE          .32547147
DURBIN-WATSON  1.36531836
Q(  11)=    57.2556          SIGNIFICANCE LEVEL  .298542E-07
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    2.332411        .1341797        17.38274
  2      T3          6    0   -.8966685E-01    .1093751E-01   -8.198102
```

```
ols G4 1963.1 1963.22
# constant T4
```

```
DEPENDENT VARIABLE     7      G4
FROM   1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .42783542      RBAR**2           .39922719
SSR          2.5267154          SEE          .35543743
DURBIN-WATSON  1.84947486
Q(  11)=    9.76560          SIGNIFICANCE LEVEL  .551587
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .8611769        .1627111        5.292675
  2      T4          8    0    .1325769        .3428271E-01    3.867167
```

```
ols G5 1963.1 1963.22
# constant T5
```

```
DEPENDENT VARIABLE     9      G5
FROM   1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
```

```
Q(  11)=    4.42715          SIGNIFICANCE LEVEL  .955718
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   2.915023        .5668676        5.142335
  2      T5         10    0   .3319646E-01    .1114349        .2979000


ols G6 1963,1 1963,22
# constant T6


DEPENDENT VARIABLE    11      G6
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .14644416       RBAR**2           .10376636
SSR           .95010077           SEE          .21795651
DURBIN-WATSON  1.78633854
Q(  11)=    15.0891          SIGNIFICANCE LEVEL  .178456
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   2.045262        .9755743E-01    20.96469
  2      T6         12    0  -.3329295E-01    .1797286E-01   -1.852401


ols G7 1963,1 1963,22
# constant T7


DEPENDENT VARIABLE    13      G7
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .14872459       RBAR**2           .10616082
SSR          1.5032750            SEE          .27416008
DURBIN-WATSON  1.37906721
Q(  11)=    17.6651          SIGNIFICANCE LEVEL  .896847E-01
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   1.405534        .1130260        12.43549
  2      T7         14    0   .1722191E-01    .9213188E-02    1.869267


ols G8 1963,1 1963,22
# constant T8


DEPENDENT VARIABLE    15      G8
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .14447304       RBAR**2          -.04530331
SSR           .36306597           SEE          .13473418
DURBIN-WATSON  1.29190092
Q(  11)=    10.6608          SIGNIFICANCE LEVEL  .472100
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   .2906112        .6594082E-01    4.407151
  2      T8         16    0  -.5648568E-02    .1884293E-01   -.2997713


ols G9 1963,1 1963,22
# constant T9
```

```
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .72177251       RBAR**2            .70786114
SSR            1.8449012          SEE          .30371872
DURBIN-WATSON   1.35233535
Q(  11)=    28.1006         SIGNIFICANCE LEVEL  .312438E-02
NO.       LABEL      VAR   LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***   ***    ************    ************    ************
  1      CONSTANT     0     0    1.364427         .1252119         10.89694
  2      T9          18     0    .7351779E-01     .1020651E-01     7.203029
```

```
ols G10 1963,1 1963,22
# constant T10
```

```
DEPENDENT VARIABLE   19      G10
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .54605146       RBAR**2            .52335404
SSR            .35670040          SEE          .13354782
DURBIN-WATSON   1.78433532
Q(  11)=    15.6530,        SIGNIFICANCE LEVEL  .154508
NO.       LABEL      VAR   LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***   ***    ************    ************    ************
  1      CONSTANT     0     0    .5532410         .5786360E-01     9.561122
  2      T10         20     0    .4108616E-01     .8376586E-02     4.904881
```

```
ols G11 1963,1 1963,22
# constant T11
```

```
DEPENDENT VARIABLE   21      G11
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .25084417       RBAR**2            .21338638
SSR            .56561265          SEE          .16816846
DURBIN-WATSON   1.24770317
Q(  11)=    25.8173         SIGNIFICANCE LEVEL  .690856E-02
NO.       LABEL      VAR   LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***   ***    ************    ************    ************
  1      CONSTANT     0     0    .6035573         .6932957E-01     8.705626
  2      T11         22     0   -.1462451E-01     .5651325E-02    -2.587801
```

```
ols G12 1963,1 1963,22
# constant T12
```

```
DEPENDENT VARIABLE   23      G12
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .14045507       RBAR**2            .09747783
SSR            .48003302          SEE          .15492466
DURBIN-WATSON   1.82864958
Q(  11)=    7.17348         SIGNIFICANCE LEVEL  .784866
NO.       LABEL      VAR   LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***   ***    ************    ************    ************
  1      CONSTANT     0     0    1.011344         .6739503E-01     15.00622
  2      T12         24     0    .1823905E-01     .1008911E-01     1.807796
```

```
DEPENDENT VARIABLE   25      G13
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .01624830      RBAR**2          -.03293929
SSR           .19504004           SEE          .98752226E-01
DURBIN-WATSON  1.60045445
Q(  11)=    12.4671         SIGNIFICANCE LEVEL  .329579
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    .1329765        .4295900E-01    3.095428
  2      T13        26    0  -.3696198E-02    .6431007E-02   -.5747463
```

```
ols G14 1963,1 1963,22
# constant T14
```

```
DEPENDENT VARIABLE   27      G14
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .78432752      RBAR**2           .77354389
SSR          1.3670695            SEE          .26144497
DURBIN-WATSON  1.28966239
Q(  11)=    15.4165         SIGNIFICANCE LEVEL  .164210
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   3.264032         .1077840        30.28308
  2      T14        28    0  -.7492942E-01    .8785895E-02   -8.528376
```

```
ols G15 1963,1 1963,22
# constant T15
```

```
DEPENDENT VARIABLE   29      G15
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .48441216      RBAR**2           .45863276
SSR          2.5190874            SEE          .35490051
DURBIN-WATSON  1.91784640
Q(  11)=    6.71944         SIGNIFICANCE LEVEL  .821327
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   1.566134         .1769075        8.852841
  2      T15        30    0  -.2342541        .5404008E-01   -4.334821
```

```
ols G16 1963,1 1963,22
# constant T16
```

```
DEPENDENT VARIABLE   31      G16
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .26908279      RBAR**2           .23253693
SSR           .66799202           SEE          .18275558
DURBIN-WATSON  1.57369042
Q(  11)=    16.5099         SIGNIFICANCE LEVEL  .123230
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    .5540664        .8235829E-01    6.727512
```

```
ols G17 1963,1 1963,22
# constant T17


DEPENDENT VARIABLE    33      G17
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2             .05903319      RBAR**2          .01198485
SSR         8.9829754           SEE          .67018562
DURBIN-WATSON  1.69253181
Q(  11)=    5.84690         SIGNIFICANCE LEVEL  .883382
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    2.049804        .3413031       6.005819
  2      T17        34    0    .1254237        .1119705       1.120149


ols G18 1963,1 1963,22
# constant T18


DEPENDENT VARIABLE    35      G18
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2             .19528689      RBAR**2          .15505123
SSR         1.7256730           SEE          .29374079
DURBIN-WATSON  1.53828230
Q(  11)=    13.9051         SIGNIFICANCE LEVEL  .238292
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .9181260E-01    .1479343        .6206311
  2      T18        36    0  -.5155458        .2340110      -2.203084


ols G19 1963,1 1963,22
# constant T19


DEPENDENT VARIABLE    37      G19
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2             .71078662      RBAR**2          .69632595
SSR         9.3188471           SEE          .68259970
DURBIN-WATSON  1.82029749
Q(  11)=    5.67322         SIGNIFICANCE LEVEL  .894254
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    3.631071        .2996122       12.11924
  2      T19        38    0  -.3374651        .4813416E-01  -7.010927


ols G20 1963,1 1963,22
# constant T20


DEPENDENT VARIABLE    39      G20
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2             .12290295      RBAR**2         -.04905190
SSR          .35801389          SEE          .13379348
DURBIN-WATSON  1.56902685
[illegible]
```

1	CONSTANT	0	0	.1183788	.6548043E-01	1.807851
2	T20	40	0	-.2515647E-02	.1871137E-01	-.1344448

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
open data b:share
cal 1963 1 1
all 0 1963,22
data 1963,1 1963,22 G1 T1 G2 T2 G3 T3 G4 T4 G5 T5 G6 T6 G9 T9 G12 T12 $
G13 T13 G15 T15 G16 T16 G17 T17 G18 T18 G19 T19 G20 T20
print 1963,1 1963,22 G1 T1 G2 T2 G3 T3 G4 T4 G5 T5 G6 T6 G9 T9 G12 T12 $
G13 T13 G15 T15 G16 T16 G17 T17 G18 T18 G19 T19 G20 T20

ols G1 1963,1 1963,22
# constant T1

DEPENDENT VARIABLE      1       G1
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2             .07490933      RBAR**2           .02865480
SSR        11.886995            SEE          .77094061
DURBIN-WATSON  1.06949825
Q(  11)=    8.65163       SIGNIFICANCE LEVEL  .654013
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ***********    ***********      ***********
  1      CONSTANT    0    0    1.118513        .3360825         3.328091
  2      T1          2    0  -.6513725E-01    .5118451E-01   -1.272597
```

```
# constant T2


DEPENDENT VARIABLE     3      G2
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .03174931      RBAR**2          -.01666323
SSR          3.6145397            SEE          .42511996
DURBIN-WATSON  1.54642565
Q(  11)=    5.50365        SIGNIFICANCE LEVEL  .904349
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .4203282        .1880372        2.235346
  2      T2          4    0  -.2588378E-01    .3196241E-01   -.8098195


ols G3 1963,1 1963,22
# constant T3


DEPENDENT VARIABLE     5      G3
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .56556418      RBAR**2           .54384239
SSR           .20738979           SEE          .10183069
DURBIN-WATSON  1.25704935
Q(  11)=    13.1381        SIGNIFICANCE LEVEL  .284396
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .3725388        .4641924E-01    8.025526
  2      T3          6    0  -.4873920E-01    .9551801E-02   -5.102619


ols G4 1963,1 1963,22
# constant T4


DEPENDENT VARIABLE     7      G4
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .01302608      RBAR**2          -.03632262
SSR          15.101543            SEE          .86895175
DURBIN-WATSON   .62652473
Q(  11)=    50.4699        SIGNIFICANCE LEVEL  .515198E-06
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .8330273        .4605148        1.808904
  2      T4          8    0    .8727836E-01   .1698782        .5137703
```

constant T5

```
DEPENDENT VARIABLE      9       G5
FROM  1963:  1   UNTIL   1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .80378226      RBAR**2           .79397137
SSR          .19227227            SEE           .98049036E-01
DURBIN-WATSON  1.66263988
Q(  11)=    7.82137         SIGNIFICANCE LEVEL  .729211
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******     ***  ***   ************    ************   ************
  1      CONSTANT     0    0    .5964732        .4451632E-01   13.39898
  2      T5          10    0  -.8101875E-01     .8950978E-02  -9.051386
```

ols G6 1963,1 1963,22
constant T6

```
DEPENDENT VARIABLE     11       G6
FROM  1963:  1   UNTIL   1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .05310699      RBAR**2           .00576234
SSR          .41246836            SEE          .14360856
DURBIN-WATSON  2.38415886
Q(  11)=    14.0644         SIGNIFICANCE LEVEL  .229450
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******     ***  ***   ************    ************   ************
  1      CONSTANT     0    0    .2172415        .7158464E-01   3.034751
  2      T6          12    0    .2315955E-01    .2186702E-01   1.059108
```

ols G9 1963,1 1963,22
constant T9

```
DEPENDENT VARIABLE     13       G9
FROM  1963:  1   UNTIL   1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .01061826      RBAR**2          -.03885083
SSR          1.0026251            SEE          .22390010
DURBIN-WATSON  1.76811995
Q(  11)=    3.83936         SIGNIFICANCE LEVEL  .974382
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******     ***  ***   ************    ************   ************
  1      CONSTANT     0    0    1.308226        .9720235E-01   13.45879
  2      T9          14    0    .6628556E-02    .1430735E-01   .4632972
```

ols G12 1963,1 1963,22
constant T12

```
DEPENDENT VARIABLE     15       G12
FROM  1963:  1   UNTIL   1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .00982156      RBAR**2          -.03968737
SSR          53.025196            SEE          1.6282690
DURBIN-WATSON  1.37580586
Q(  11)=    8.46763         SIGNIFICANCE LEVEL  .670902
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
```

```
ols G13 1963,1 1963,22
# constant T13


DEPENDENT VARIABLE    17      G13
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .01827148      RBAR**2          -.03081494
SSR          23.723358            SEE          1.0891134
DURBIN-WATSON  1.32397086
Q(  11)=    10.8846         SIGNIFICANCE LEVEL  .452982
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .3152427        .5246406        .6008736
  2      T13        18    0    .8591375E-01    .1408175        .6101073


ols G15 1963,1 1963,22
# constant T15


DEPENDENT VARIABLE    19      G15
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .14969942      RBAR**2           .10718439
SSR          36.146047            SEE          1.3443595
DURBIN-WATSON  1.56136260
Q(  11)=    18.0088         SIGNIFICANCE LEVEL  .813762E-01
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0   1.982604         .6309490       3.142257
  2      T15        20    0  -.2833246         .1509891      -1.876458


ols G16 1963,1 1963,22
# constant T16


DEPENDENT VARIABLE    21      G16
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .06164613      RBAR**2           .01472844
SSR          5.2574596            SEE          .51271140
DURBIN-WATSON  1.84876358
Q(  11)=    7.75023         SIGNIFICANCE LEVEL  .735488
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .1375327        .2420572        .5681825
  2      T16        22    0    .6824914E-01    .5954052E-01   1.146264


ols G17 1963,1 1963,22
# constant T17


DEPENDENT VARIABLE    23      G17
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .04993276      RBAR**2           .00242940
```

```
NO.       LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0    .3405371       .1401851         2.429196
  2      T17        24    0    .9613281E-01   .9376506E-01     1.025252


ols G18 1963,1 1963,22
# constant T18


DEPENDENT VARIABLE    25      G18
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .00768379        RBAR**2          -.04193202
SSR           1.8977168            SEE           .30803545
DURBIN-WATSON  1.76869466
Q(  11)=    16.0057          SIGNIFICANCE LEVEL  .140918
NO.       LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0   -.8008239E-01   .2987056        -.2680980
  2      T18        26    0    .1092127       .2775207         .3935298


ols G19 1963,1 1963,22
# constant T19


DEPENDENT VARIABLE    27      G19
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .93480402        RBAR**2           .93154422
SSR           3.0482891            SEE           .39040294
DURBIN-WATSON  1.35104835
Q(  11)=    4.46557          SIGNIFICANCE LEVEL  .954271
NO.       LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0    4.752817       .1747445         27.19866
  2      T19        28    0   -.5451616       .3219292E-01   -16.93421


ols G20 1963,1 1963,22
# constant T20


DEPENDENT VARIABLE    29      G20
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .69647997        RBAR**2           .68130397
SSR           .54361652E-01        SEE           .52135234E-01
DURBIN-WATSON  2.11636332
Q(  11)=    9.40632          SIGNIFICANCE LEVEL  .584441
NO.       LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0    .5469262       .2267977E-01     24.11516
  2      T20        30    0   -.2300060E-01   .3395185E-02    -6.774475


end


          NORMAL COMPLETION OF JOB
                 HALT AT      0
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:in
cal 1963 1 1
all 0 1963.22
data 1963,1 1963,22 G1 T1 G2 T2 G3 T3 G4 T4 G5 T5 G6 T6 G7 T7 G8 T8 G9 T9 $
G10 T10 G11 T11 G12 T12 G13 T13 G14 T14 G15 T15 G16 T16 G17 T17 G18 T18 $
G19 T19 G20 T20
print 1963,1 1963.22 G1 T1 G2 T2 G3 T3 G4 T4 G5 T5 G6 T6 G7 T7 G8 T8 G9 T9 $
G10 T10 G11 T11 G12 T12 G13 T13 G14 T14 G15 T15 G16 T16 G17 T17 G18 T18 $
G19 T19 G20 T20

ols G1 1963,1 1963,22
# constant T1


DEPENDENT VARIABLE      1       G1
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM       20
R**2               .26486539       RBAR**2            .22810866
SSR           2051.8651            SEE         10.128833
DURBIN-WATSON  1.56902143
Q(  11)=    3.19674          SIGNIFICANCE LEVEL   .987862
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
```

```
  3      T1          2    0  -1.486338        .5536984       -2.684381


ols G2 1963,1 1963,22
# constant T2


DEPENDENT VARIABLE      3       G2
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                22      DEGREES OF FREEDOM      20
R**2               .01615045      RBAR**2          -.03304202
SSR           14907.154           SEE           27.301240
DURBIN-WATSON  1.47706840
Q(  11)=    7.95666          SIGNIFICANCE LEVEL  .717181
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    25.25296        11.25528         2.243655
  2      T2          4    0    .5256917        .9174620         .5729847


ols G3 1963,1 1963,22
# constant T3


DEPENDENT VARIABLE      5       G3
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                22      DEGREES OF FREEDOM      20
R**2               .13669433      RBAR**2           .09352905
SSR            3652.7906          SEE           13.514419
DURBIN-WATSON  1.65656528
Q(  11)=    8.88936          SIGNIFICANCE LEVEL  .632104
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0   -7.783045        9.485923        -.8204838
  2      T3          6    0    10.53057        5.917575         1.779541


ols G4 1963,1 1963,22
# constant T4


DEPENDENT VARIABLE      7       G4
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                22      DEGREES OF FREEDOM      20
R**2               .12307213      RBAR**2           .07922573
SSR            3731.7267          SEE           13.659661
DURBIN-WATSON  1.34460753
Q(  11)=    40.6483          SIGNIFICANCE LEVEL  .277003E-04
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    41.62055        5.631368         7.390843
  2      T4          8    0   -.7690570        .4590348        -1.675378


ols G5 1963,1 1963,22
# constant T5


DEPENDENT VARIABLE      9       G5
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                22      DEGREES OF FREEDOM      20
```

```
Q(  11)=    11.4213          SIGNIFICANCE LEVEL  .408673
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0   7.593343        .5056372        15.01737
  2      T5         10    0  -.3635783        .1243752       -2.923239


ols G6 1963,1 1963,22
# constant T6


DEPENDENT VARIABLE    11       G6
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .36021476      RBAR**2           .32822550
SSR          574.85752            SEE          5.3612383
DURBIN-WATSON  1.64961515
Q(  11)=    7.88828          SIGNIFICANCE LEVEL  .723275
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0   14.73738        2.285062        6.449444
  2      T6         12    0  -.9528526        .2839534       -3.355665


ols G7 1963,1 1963,22
# constant T7


DEPENDENT VARIABLE    13       G7
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .09097099      RBAR**2           .04551954
SSR          72.638128            SEE          1.9057561
DURBIN-WATSON  1.75821733
Q(  11)=    5.57659          SIGNIFICANCE LEVEL  .899952
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0   13.59363        .8619545        15.77070
  2      T7         14    0   .2397185        .1694431        1.414743


ols G8 1963,1 1963,22
# constant T8


DEPENDENT VARIABLE    15       G8
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2               .24646364      RBAR**2           .20878682
SSR          9671.8447            SEE          21.990731
DURBIN-WATSON  1.61847281
Q(  11)=    10.9709          SIGNIFICANCE LEVEL  .445707
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0   125.9396        9.372867        13.43661
  2      T8         16    0  -2.978934        1.164720       -2.557639


ols G9 1963,1 1963,22
# constant T9
```

```
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .75017296      RBAR**2            .73768161
SSR          627.30435            SEE          5.6004658
DURBIN-WATSON   1.30184932
Q(  11)=     12.4057        SIGNIFICANCE LEVEL  .333933
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0    53.35968        2.308863        23.11081
  2     T9         18    0   -1.458498        .1882044       -7.749541


ols G10 1963,1 1963,22
# constant T10


DEPENDENT VARIABLE    19      G10
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .11173123      RBAR**2            .06731779
SSR          753.98140            SEE          6.1399568
DURBIN-WATSON   1.72728943
Q(  11)=     13.8410        SIGNIFICANCE LEVEL  .241914
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0    8.955506        3.948329        2.268176
  2     T10        20    0   -3.438654        2.167996       -1.586098


ols G11 1963,1 1963,22
# constant T11


DEPENDENT VARIABLE    21      G11
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .12878799      RBAR**2            .08522739
SSR          4505.9085            SEE          15.009844
DURBIN-WATSON   1.49154618
Q(  11)=     18.4858        SIGNIFICANCE LEVEL  .709712E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0    22.10672        6.187998        3.572516
  2     T11        22    0   -.8673066        .5044079       -1.719455


ols G12 1963,1 1963,22
# constant T12


DEPENDENT VARIABLE    23      G12
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2               .83511260      RBAR**2            .82686823
SSR          97929.177            SEE          69.974701
DURBIN-WATSON   1.31449640
Q(  11)=     56.4460        SIGNIFICANCE LEVEL  .420772E-07
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0    403.9565        28.84795        14.00295
  2     T12        24    0   -23.66685        2.351510       -10.06454
```

```
DEPENDENT VARIABLE    25      G13
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     20
R**2               .08395364      RBAR**2           .03815132
SSR           764846.76           SEE            195.55648
DURBIN-WATSON  1.63088554
Q(  11)=    10.0170          SIGNIFICANCE LEVEL  .528859
NO.       LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT     0    0    322.4656         84.57004         3.813000
  2      T13         26    0   -16.30612         12.04411        -1.353867
```

```
ols G14 1963,1 1963,22
# constant T14
```

```
DEPENDENT VARIABLE    27      G14
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     20
R**2               .56917996      RBAR**2           .54763896
SSR           9154.2316           SEE            21.394195
DURBIN-WATSON  1.60756817
Q(  11)=    11.2082          SIGNIFICANCE LEVEL  .425991
NO.       LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT     0    0    34.46558         9.070635         3.799688
  2      T14         28    0    5.483285         1.066716         5.140340
```

```
ols G15 1963,1 1963,22
# constant T15
```

```
DEPENDENT VARIABLE    29      G15
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     20
R**2               .74584826      RBAR**2           .73314067
SSR           1320914.0           SEE            256.99358
DURBIN-WATSON  1.46908417
Q(  11)=    10.3415          SIGNIFICANCE LEVEL  .499954
NO.       LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT     0    0    1428.182         108.2117         13.19803
  2      T15         30    0   -90.23410         11.77815        -7.661145
```

```
ols G16 1963,1 1963,22
# constant T16
```

```
DEPENDENT VARIABLE    31      G16
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     20
R**2               .23104414      RBAR**2           .19259634
SSR           3558.3083           SEE            13.338494
DURBIN-WATSON  1.38114092
Q(  11)=    46.7598          SIGNIFICANCE LEVEL  .237219E-05
NO.       LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******    ***  ***    ************    ************    ************
  1      CONSTANT     0    0    32.08300         5.498962         5.834374
```

```
ols G17 1963,1 1963,22
# constant T17


DEPENDENT VARIABLE    33       G17
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .23324778       RBAR**2            .19491017
SSR           345.10332           SEE           4.1539338
DURBIN-WATSON  1.65185335
Q(  11)=    10.7024         SIGNIFICANCE LEVEL  .468517
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT     0    0   25.80603        1.781044       14.48927
  2      T17         34    0  -.5786939        .2346133      -2.466586


ols G18 1963,1 1963,22
# constant T18


DEPENDENT VARIABLE    35       G18
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .00584264       RBAR**2           -.04386523
SSR          1172.4133            SEE           7.6564132
DURBIN-WATSON  1.55777844
Q(  11)=    9.73251         SIGNIFICANCE LEVEL  .554597
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT     0    0   3.202035        3.593389       .8910907
  2      T18         36    0   .2948135        .8599149       .3428403


ols G19 1963,1 1963,22
# constant T19


DEPENDENT VARIABLE    37       G19
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .43348829       RBAR**2            .40516270
SSR          1122.5953            SEE           7.4919799
DURBIN-WATSON  1.40288937
Q(  11)=    9.18300         SIGNIFICANCE LEVEL  .605005
NO.       LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************   ************   ************
  1      CONSTANT     0    0   18.91222        3.193224       5.922609
  2      T19         38    0  -1.552308        .3968063      -3.912004


ols G20 1963,1 1963,22
# constant T20


DEPENDENT VARIABLE    39       G20
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .57541985       RBAR**2            .55419084
SSR           290.35830           SEE           3.8102382
DURBIN-WATSON  1.64987169
```

```
DEPENDENT VARIABLE    35      G20
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .57541985     RBAR**2            .55419084
SSR          290.35830          SEE          3.8102382
DURBIN-WATSON  1.64987169
Q(  11)=     8.09266        SIGNIFICANCE LEVEL  .704980
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******     ***  ***    ************    ************    ************
  1      CONSTANT     0    0    32.79054         1.723333         19.02740
  2      T20         36    0   -1.763747         .3387730        -5.206281


end


          NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS         0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:teliko
cal 1963.1 1
all 0 1963,21
data 1963,1 1963,21 GCP68 UCP68 GCP74 UCP74 GCP78 UCP78 GCP84 UCP84 GCP94 $
UCP94 GLP68 ULP68 GLP74 ULP74 GLP78 ULP78 GLP84 ULP84 GLP94 ULP94 GGP68 UGP6E $
GGP74 UGP74 GGP78 UGP78 GGP84 UGP84 GGP94 UGP94 GST68 UST68 GST74 UST74 GST78 $
UST78 GST84 UST84 GST94 UST94 GLA68 ULA68 GLA74 ULA74 GLA78 ULA78 GLA84 ULA84 $
GLA94 ULA94 GTP68 UTP68 GTP74 UTP74 GTP78 UTP78 GTP84 UTP84 GTP94 UTP94 GLS6E $
ULS68 GLS74 ULS74 GLS78 ULS78 GLS84 ULS84 GLS94 ULS94 GCS68 UCS68 GCS74 UCS74 $
GCS78 UCS78 GCS84 UCS84 GCS94 UCS94
set GTI68 1963,1 1963,21 = GCS68(t)+GLS68(t)
set GTI74 1963,1 1963,21 = GCS74(t)+GLS74(t)
set GTI78 1963,1 1963,21 = GCS78(t)+GLS78(t)
set GTI84 1963,1 1963,21 = GCS84(t)+GLS84(t)
set GTI94 1963,1 1963,21 = GCS94(t)+GLS94(t)
set UTI68 1963,1 1963,21 = UCS68(t)+ULS68(t)
set UTI74 1963,1 1963,21 = UCS74(t)+ULS74(t)
set UTI78 1963,1 1963,21 = UCS78(t)+ULS78(t)
set UTI84 1963,1 1963,21 = UCS84(t)+ULS84(t)
set UTI94 1963,1 1963,21 = UCS94(t)+ULS94(t)
ols(define=1) GLP68 1963,1 1963,21
# constant GTI68 GTP68 GLA68


EQUATION     1
DEPENDENT VARIABLE    11      GLP68
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS               21      DEGREES OF FREEDOM     17
R**2              .95991980      RBAR**2             .95284682
SSR           552.49224          SEE            5.7008371
DURBIN-WATSON  2.71499896
Q(  10)=    10.6263        SIGNIFICANCE LEVEL  .387368
NO.       LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    16.11744        2.788290        5.780404
  2      GTI68      81    0    .7196646        .4626990E-01    15.55362
  3      GTP68      51    0    .7218455        .4301257E-01    16.78220
  4      GLA68      41    0   -1.223073        .1314046       -9.307685


ols(define=3) GLP74 1963,1 1963,21
# constant GTI74 GTP74 GLA74


EQUATION     3
DEPENDENT VARIABLE    13      GLP74
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS               21      DEGREES OF FREEDOM     17
R**2              .97357991      RBAR**2             .96891754
SSR           352.62012          SEE            4.5543781
DURBIN-WATSON  2.79892403
Q(  10)=    10.4653        SIGNIFICANCE LEVEL  .400659
NO.       LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***      *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    4.181523        2.667384        1.567649
  2      GTI74      82    0    .9568158        .5664561E-01    16.89126
                               [illegible]     .3411915E-01    22.62470
```

```
ols GLP74 1963,1 1963,21 res cog
# constant gti74 gtp74 gla74


DEPENDENT VARIABLE    13      GLP74
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2               .97357991      RBAR**2           .96891754
SSR           352.62012           SEE          4.5543781
DURBIN-WATSON  2.79892403
Q(  10)=     10.4653         SIGNIFICANCE LEVEL  .400659
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1     CONSTANT     0    0   4.181523        2.667384         1.567649
  2     GTI74       82    0   .9568158        .5664561E-01     16.89126
  3     GTP74       53    0   .7719353        .3411915E-01     22.62470
  4     GLA74       43    0  -1.304379        .8155588E-01    -15.99368


set concon 63,1 83,1 =cog(1)
set concon1 63,1 83,1 =concon(t)+cog(2)*gti74(t)
set concon2 63,1 83,1 =concon1(t)+cog(3)*gtp74(t)
set concon3 63,1 83,1 =concon2(t)+cog(4)*gla74(t)
print(dates) 63,1 83,1 concon1 concon2 concon3 glp74

 ENTRY          CONCON1   94       CONCON2   95       CONCON3   96       GLP74      13
 1963:   1        45.3246           49.9562           31.6949           31.0000
 1964:   1        55.8496           77.4638           85.2900           93.0000
 1965:   1       -16.8684          -9.14907           19.5473           13.0000
 1966:   1        71.1586           85.8254           50.6072           50.0000
 1967:   1        43.4110           48.8145           54.0320           54.0000
 1968:   1        66.3746           76.4097           50.3221           48.0000
 1969:   1        52.0223           36.5836           23.5398           18.0000
 1970:   1        28.1019           60.5232           59.3493           66.0000
 1971:   1        72.0198           72.0970           57.7488           55.0000
 1972:   1        21.4042           37.6148           12.8316           17.0000
 1973:   1        81.6836           140.351           75.1317           72.0000
 1974:   1        34.7996           103.502           55.2399           61.0000
 1975:   1        327.585           128.426          -16.3601          -15.0000
 1976:   1        72.1154           69.0277           52.0708           48.0000
 1977:   1        61.5905           166.574           62.2234           65.0000
 1978:   1        56.8064           81.5083           44.9857           46.0000
 1979:   1        55.8496           76.6918           27.1254           30.0000
 1980:   1        108.474           86.0883           11.7387           14.0000
 1981:   1        97.9495           185.950           77.6866           70.0000
 1982:   1        65.4177           107.874           75.2647           74.0000
 1983:   1        53.9359           76.3221           48.9301           49.0000


ols(define=5) GLP78 1963,1 1963,21
# constant GTI78 GTP78 GLA78


EQUATION     5
DEPENDENT VARIABLE    15      GLP78
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2               .98485990      RBAR**2           .98218812
SSR           201.69860           SEE          3.4445063
DURBIN-WATSON  1.97907951
Q(  10)=     4.50087         SIGNIFICANCE LEVEL  .921937
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
```

2	GTI78	[illegible]	0	[illegible]	[illegible]	[illegible]
3	GTP78	55	0	.8571940	.5584226E-01	15.35027
4	GLA78	45	0	-.9056248	.1069657	-8.466498

```
ols(define=7) GLP84 1963,1 1963,21
# constant GTI84 GTP84 GLA84
```

EQUATION 7
DEPENDENT VARIABLE 17 GLP84
FROM 1963: 1 UNTIL 1983: 1
OBSERVATIONS 21 DEGREES OF FREEDOM 17
R**2 .99809144 RBAR**2 .99775464
SSR 22.376871 SEE 1.1472953
DURBIN-WATSON 2.00494273
Q(10)= 7.50991 SIGNIFICANCE LEVEL .676588

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	.4938541	.3017076	1.636863
2	GTI84	84	0	.8483347	.5030862E-01	16.86261
3	GTP84	57	0	.9667709	.1284026E-01	75.29218
4	GLA84	47	0	-.8450192	.6720532E-01	-12.57370

```
ols(define=9) GLP94 1963,1 1963,21
# constant GTI94 GTP94 GLA94
```

EQUATION 9
DEPENDENT VARIABLE 19 GLP94
FROM 1963: 1 UNTIL 1983: 1
OBSERVATIONS 21 DEGREES OF FREEDOM 17
R**2 .89058890 RBAR**2 .87128106
SSR 31948.509 SEE 43.351171
DURBIN-WATSON 2.39628295
Q(10)= 4.62544 SIGNIFICANCE LEVEL .914755

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	88.38390	15.40778	5.736316
2	GTI94	85	0	.5378435	.5023294E-01	10.70699
3	GTP94	59	0	.4949012	.4393970E-01	11.26319
4	GLA94	49	0	-1.546950	.1838336	-8.414947

```
ols(define=2) ULP68 1963,1 1963,21
# constant UTI68 UTP68 ULA68
```

EQUATION 2
DEPENDENT VARIABLE 12 ULP68
FROM 1963: 1 UNTIL 1983: 1
OBSERVATIONS 21 DEGREES OF FREEDOM 17
R**2 .99982320 RBAR**2 .99979200
SSR 26.865749 SEE 1.2571150
DURBIN-WATSON 1.72386035
Q(10)= 10.8370 SIGNIFICANCE LEVEL .370359

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	1.047721	.3805500	2.753177
2	UTI68	86	0	.9505109	.4556797E-01	20.85919
3	UTP68	52	0	.9375228	.3130630E-02	299.4677
4	ULA68	42	0	-1.046381	.6185177E-01	-16.91756

```
ols(define=4) ULP74 1963,1 1963,21
# constant UTI74 UTP74 ULA74


EQUATION     4
DEPENDENT VARIABLE    14      ULP74
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2               .98816121      RBAR**2            .98607201
SSR          94.984314            SEE          2.3637497
DURBIN-WATSON  1.64751384
Q(  10)=    8.03937        SIGNIFICANCE LEVEL  .624991
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT     0    0   -4.742036       1.144030        -4.145029
  2     UTI74       87    0    1.192500       .6797858E-01    17.54229
  3     UTP74       54    0    1.252575       .4170667E-01    30.03296
  4     ULA74       44    0   -1.521193       .7700573E-01   -19.75428


ols(define=6) ULP78 1963,1 1963,21
# constant UTI78 UTP78 ULA78


EQUATION     6
DEPENDENT VARIABLE    16      ULP78
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2               .99787751      RBAR**2            .99750295
SSR          6.3952488            SEE          .61334420
DURBIN-WATSON  2.21024348
Q(  10)=    8.19663        SIGNIFICANCE LEVEL  .609637
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT     0    0   -.4581189       .4005673        -1.143675
  2     UTI78       88    0    .9603495       .3528417E-01    27.21757
  3     UTP78       56    0    1.070047       .1367895E-01    78.22586
  4     ULA78       46    0   -1.077693       .5833771E-01   -18.47336


ols(define=8) ULP84 1963,1 1963,21
# constant UTI84 UTP84 ULA84


EQUATION     8
DEPENDENT VARIABLE    18      ULP84
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2               .97870050      RBAR**2            .97494177
SSR          425.24953            SEE          5.0014676
DURBIN-WATSON  1.44628618
Q(  10)=    10.4841        SIGNIFICANCE LEVEL  .399093
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT     0    0   -5.430143       2.801144        -1.938545
  2     UTI84       89    0    .8843050       .3296298         2.682722
  3     UTP84       58    0    1.152163       .4405782E-01    26.15116
  4     ULA84       48    0   -1.279266       .3358900        -3.808586


ols(define=10) ULP94 1963,1 1963,21
# constant UTI94 UTP94 ULA94
```

```
EQUATION      3
DEPENDENT VARIABLE    13      GLP74
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS               21      DEGREES OF FREEDOM      17
R**2              .97351629      RBAR**2            .96884269
SSR           353.46927          SEE           4.5598586
DURBIN-WATSON  2.79032585
Q(  10)=    10.1589        SIGNIFICANCE LEVEL  .426663
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   4.387206        2.390322         1.835404
  2      GTI74      82    0    .9522857       .5072432E-01    18.77375
  3      GTP74      53    0    .7715625       .3056774E-01    25.24107
  4      GLA74      43    0  -1.300626        .7306825E-01   -17.80015
```

```
EQUATION      4
DEPENDENT VARIABLE    14      ULP74
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS               21      DEGREES OF FREEDOM      17
R**2              .98815183      RBAR**2            .98606098
SSR           95.059528          SEE           2.3646854
DURBIN-WATSON  1.63016277
Q(  10)=    8.16012        SIGNIFICANCE LEVEL  .613200
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  5      CONSTANT    0    0  -4.650802        1.025814        -4.533765
  6      UTI74      87    0   1.185866        .6088643E-01    19.47668
  7      UTP74      54    0   1.252295        .3737286E-01    33.50814
  8      ULA74      44    0  -1.513401        .6900791E-01   -21.93084
```

```
         COVARIANCE/CORRELATION MATRIX
    VARIABLE               GLP74          ULP74
          SERIES LAG      13    0         14    0
    GLP74      13    0    16.832          .13177
    ULP74      14    0    1.1502          4.5266
```

```
SUR 2 63,1 63,21
# 5
# 6
```

```
EQUATION      5
DEPENDENT VARIABLE    15      GLP78
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS               21      DEGREES OF FREEDOM      17
R**2              .98435728      RBAR**2            .98159680
SSR           208.39458          SEE           3.5012147
DURBIN-WATSON  2.19565014
Q(  10)=    3.63632        SIGNIFICANCE LEVEL  .962266
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   -.8582976       1.572350        -.5458693
  2      GTI78      83    0    .9975227       .4736562E-01    21.06006
  3      GTP78      55    0    .8804473       .3946684E-01    22.30853
  4      GLA78      45    0   -.9107343       .7671969E-01   -11.87093
```

```
FROM  1963:  1  UNTIL   1983:   1
OBSERVATIONS               21      DEGREES OF FREEDOM      17
R**2               .99344859       RBAR**2            .99229246
SSR           4366.7627            SEE           16.027114
DURBIN-WATSON  1.54532240
Q(  10)=    14.5379          SIGNIFICANCE LEVEL  .149840
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1      CONSTANT     0    0  -51.00895        13.36103        -3.817741
  2      UTI94       90    0    1.516817        .2258537         6.715927
  3      UTP94       60    0    1.507643        .2985795E-01    50.49385
  4      ULA94       50    0   -2.924853        .3953518        -7.398100


SUR 2 63,1 63,21
# 1
# 2


EQUATION     1
DEPENDENT VARIABLE    11      GLP68
FROM  1963:  1  UNTIL   1983:   1
OBSERVATIONS               21      DEGREES OF FREEDOM      17
R**2               .95960982       RBAR**2            .95248215
SSR           556.76512            SEE           5.7228393
DURBIN-WATSON  2.65443711
Q(  10)=     9.45088         SIGNIFICANCE LEVEL  .489914
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1      CONSTANT     0    0    16.30809        2.352094         6.933434
  2      GTI68       81    0    .7141952        .3840307E-01    18.59734
  3      GTP68       51    0    .7185916        .3576658E-01    20.09115
  4      GLA68       41    0   -1.198201        .1095565       -10.93683


EQUATION     2
DEPENDENT VARIABLE    12      ULP68
FROM  1963:  1  UNTIL   1983:   1
OBSERVATIONS               21      DEGREES OF FREEDOM      17
R**2               .99981740       RBAR**2            .99978518
SSR           27.746174            SEE           1.2775476
DURBIN-WATSON  1.74742058
Q(  10)=     8.39314         SIGNIFICANCE LEVEL  .590494
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  5      CONSTANT     0    0    1.165870        .3348157         3.482124
  6      UTI68       86    0    .9331608        .3913172E-01    23.84666
  7      UTP68       52    0    .9375451        .2611985E-02   358.9397
  8      ULA68       42    0   -1.050677        .5232133E-01   -20.08123


         COVARIANCE/CORRELATION MATRIX
    VARIABLE                GLP68        ULP68
          SERIES LAG        11    0      12    0
    GLP68      11    0      26.513       .48222
    ULP68      12    0      2.8541       1.3212


SUR 2 63,1 63,21
# 3
```

```
EQUATION     6
DEPENDENT VARIABLE    16      ULP78
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2                .99785225     RBAR**2            .99747324
SSR            6.4713474          SEE          .61698257
DURBIN-WATSON  2.26016549
Q(  10)=     6.97235       SIGNIFICANCE LEVEL  .728053
NO.     LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***    *******    ***  ***   ************   ************   ************
  5     CONSTANT    0    0  -.4551800        .2887444       -1.576411
  6     UTI78      88    0   .9733208        .2579132E-01    37.73831
  7     UTP78      56    0   1.068645        .9673450E-02    110.4719
  8     ULA78      46    0  -1.086270        .4040669E-01   -26.88343



        COVARIANCE/CORRELATION MATRIX
    VARIABLE              GLP78          ULP78
          SERIES LAG    15    0        16    0
    GLP78      15    0   9.9236         -.68934
    ULP78      16    0  -1.2055          .30816


SUR 2 63,1 63,21
# 7
# 8


EQUATION     7
DEPENDENT VARIABLE    17      GLP84
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2                .99808846     RBAR**2            .99775113
SSR           22.411809           SEE          1.1481906
DURBIN-WATSON  2.01835713
Q(  10)=     7.34431       SIGNIFICANCE LEVEL  .692589
NO.     LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***    *******    ***  ***   ************   ************   ************
  1     CONSTANT    0    0   .4888295        .2709629        1.804046
  2     GTI84      84    0   .8460090        .4492465E-01    18.83173
  3     GTP84      57    0   .9688071        .1146147E-01    84.52727
  4     GLA84      47    0  -.8398325        .6014989E-01   -13.96233



EQUATION     8
DEPENDENT VARIABLE    18      ULP84
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM      17
R**2                .97866000     RBAR**2            .97489412
SSR          426.05820            SEE          5.0062208
DURBIN-WATSON  1.43949864
Q(  10)=    10.6622        SIGNIFICANCE LEVEL  .384436
NO.     LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***    *******    ***  ***   ************   ************   ************
  5     CONSTANT    0    0  -5.609000        2.500523       -2.243131
  6     UTI84      89    0   .9388058        .2939960        3.193261
  7     UTP84      58    0   1.157173        .3938811E-01    29.37873
  8     ULA84      48    0  -1.329821        .2995713       -4.439082
```

```
    VARIABLE             GLP84        ULP84
         SERIES LAG     17   0       18   0
    GLP84      17   0   1.0672       .16136
    ULP84      18   0   .75085       20.288


SUR 2 63,1 63,21
# 9
# 10


EQUATION    9
DEPENDENT VARIABLE   19      GLP94
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM     17
R**2               .89031238      RBAR**2           .87095574
SSR           32029.256           SEE          43.405920
DURBIN-WATSON  2.35485345
Q(  10)=    4.65649        SIGNIFICANCE LEVEL  .912913
NO.     LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***    *******    ***  ***   ************   ************   ************
  1     CONSTANT    0    0   86.49717       13.82227        6.257813
  2     GTI94      85    0   .5480087       .4500478E-01   12.17668
  3     GTP94      59    0   .5036972       .3936321E-01   12.79614
  4     GLA94      49    0  -1.568503       .1646878       -9.524101


EQUATION    10
DEPENDENT VARIABLE   20      ULP94
FROM  1963:  1  UNTIL  1983:  1
OBSERVATIONS              21      DEGREES OF FREEDOM     17
R**2               .99344302      RBAR**2           .99228591
SSR           4370.4749           SEE          16.033925
DURBIN-WATSON  1.51501713
Q(  10)=    14.9737        SIGNIFICANCE LEVEL  .133024
NO.     LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***    *******    ***  ***   ************   ************   ************
  5     CONSTANT    0    0  -51.79579       11.97272       -4.326150
  6     UTI94      90    0   1.510882       .2023799        7.465572
  7     UTP94      60    0   1.509484       .2679292E-01   56.33892
  8     ULA94      50    0  -2.940468       .3541624       -8.302598


        COVARIANCE/CORRELATION MATRIX
    VARIABLE             GLP94        ULP94
         SERIES LAG     19   0       20   0
    GLP94      19   0   1525.2       .13308
    ULP94      20   0   74.975       208.12


end

        NORMAL COMPLETION OF JOB
                  HALT AT     0
                       0 ERRORS        0 WARNINGS
```

APPENDIX SIX
STATISTICAL APPENDIX FOR CHAPTER FIVE

```
open data b:albe
cal 1974 1 1
all 0 1974,21
data 1974,1 1974,21 WA R CS

set alpha 1974,1 1974,21 = (WA(t))/(WA(t)+R(t)*CS(t))
set betha 1974,1 1974,21 = (R(t)*CS(t))/(WA(t)+R(t)*CS(t))
print 1974,1 1974,21 alpha
```

ENTRY	ALPHA 4
1	.678712
2	.385059
3	1.01337
4	.602058
5	.855249
6	.804636
7	.786923
8	.491711
9	.550281
10	.818277
11	.449586
12	.336548
13	.301407
14	.489035
15	.600505
16	.716532
17	.776151
18	.710924
19	.871152
20	.774264
21	.600136

```
print 1974,1 1974,21 betha
```

ENTRY	BETHA 5
1	.321288
2	.614941
3	-.133705E-01
4	.397942
5	.144751
6	.195364
7	.213077
8	.508289
9	.449719
10	.181723
11	.550414
12	.663452
13	.698593
14	.510965
15	.399495
16	.283468
17	.223849
18	.289076
19	.128848
20	.225736
21	.399864

```
end
```

```
NORMAL COMPLETION OF JOB
       HALT AT      0
          0 ERRORS            0 WARNINGS
```

```
open data b:alb
cal 1974 1 1
all 0 1974,21
data 1974,1 1974,21 WA R CS
set alpha 1974,1 1974,21 = (WA(t))/(WA(t)+R(t)*CS(t))
set betha 1974,1 1974,21 = (R(t)*CS(t))/(WA(t)+R(t)*CS(t))
print 1974,1 1974,21 alpha
```

ENTRY	ALPHA 4
1	.759295
2	.633653
3	.905502
4	.763438
5	.865623
6	.718125
7	.701072
8	.719812
9	.808835
10	.654236
11	.823556
12	.529110
13	.703052
14	.827503
15	.919275
16	.844387
17	.930364
18	.931038
19	1.32995
20	.783429
21	.828202

```
print 1974,1 1974,21 betha
```

ENTRY	BETHA 5
1	.240705
2	.366347
3	.944978E-01
4	.236562
5	.134377
6	.281875
7	.298928
8	.280188
9	.191165
10	.345764
11	.176444
12	.470890
13	.296948
14	.172497
15	.807250E-01
16	.155613
17	.696359E-01
18	.689616E-01
19	-.329952
20	.216571
21	.171798

```
end

          NORMAL COMPLETION OF JOB
                 HALT AT    0
                    0 ERRORS           0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -     60
OPE -     10
DAT -    200
MAT -     30
GLO -    500
LOC -      0
CON -    200
COM -    300
SER -    100
open data b:orde
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 V68 V74 V78 V84 V94 S68 S74 S78 S84 S94 E68 E74 E78 E84 $
E94 SW SP

set W68 1963,1 1963,21 = SW(t)*E68(t)
set W74 1963,1 1963,21 = SW(t)*E74(t)
set W78 1963,1 1963,21 = SW(t)*E78(t)
set W84 1963,1 1963,21 = SW(t)*E84(t)
set W94 1963,1 1963,21 = SW(t)*E94(t)
set P68 1963,1 1963,21 = SP(t)*S68(t)
set P74 1963,1 1963,21 = SP(t)*S74(t)
set P78 1963,1 1963,21 = SP(t)*S78(t)
set P84 1963,1 1963,21 = SP(t)*S84(t)
set P94 1963,1 1963,21 = SP(t)*S94(t)
set T68 1963,1 1963,21 = W68(t)+P68(t)
set T74 1963,1 1963,21 = W74(t)+P74(t)
set T78 1963,1 1963,21 = W78(t)+P78(t)
set T84 1963,1 1963,21 = W84(t)+P84(t)
set T94 1963,1 1963,21 = W94(t)+P94(t)
set R68 1963,1 1963,21 = V68(t)-T68(t)
set R74 1963,1 1963,21 = V74(t)-T74(t)
set R78 1963,1 1963,21 = V78(t)-T78(t)
set R84 1963,1 1963,21 = V84(t)-T84(t)
set R94 1963,1 1963,21 = V94(t)-T94(t)
print 1963,1 1963,21 W68 W74 W78 W84 W94 P68 P74 P78 P84 P94 T68 T74 T78 T84 $
T94 R68 R74 R78 R84 R94
```

ENTRY	W68 18	W74 19	W78 20	W84 21
1	-.680000E-01	9.52000	-.680000E-01	4.08000
2	6.46000	-2.28000	-.190000	3.80000
3	-26.0000	-22.0000	9.00000	5.00000
4	-.540000	16.2000	7.20000	-9.60000
5	1.29000	-3.44000	24.0800	11.1800
6	-.800000	16.0000	5.60000	.800000
7	9.48000	7.90000	21.3300	1.58000
8	14.2100	.441000	16.1700	-.490000
9	2.20000	6.05000	6.60000	1.65000
10	-4.92000	15.5800	39.3600	8.20000
11	14.4000	22.5000	11.2500	1.80000
12	8.50000	12.5800	7.14000	2.04000
13	8.10000	33.3000	6.00000	6.90000
14	1.96000	6.37000	1.96000	-.294000
15	41.4000	48.0000	5.88000	9.00000
16	-.216000	20.1600	6.98400	-2.16000
17	11.7000	29.6400	7.48800	9.36000
18	29.1100	40.4700	5.68000	-2.84000
19	-.783000	72.2100	29.5800	17.4000
20	6.16000	19.2500	.770000	6.93000
21	2.40000	12.6000	8.40000	2.40000

ENTRY	W94 22	P68 23	P74 24	P78 25
1	13.6000	9.28000	33.6000	21.4400
2	7.98000	47.1200	55.8000	25.4200

6	24.0000	86.2000	49.0000	5.80000
7	46.6100	31.9200	42.4200	17.6400
8	34.3000	64.2600	24.4800	37.2300
9	18.1500	164.250	64.8000	19.8000
10	66.4200	7.02000	2.34000	16.0200
11	70.6500	83.0500	58.3000	41.8000
12	41.1400	96.3600	19.1400	11.2200
13	88.8000	1026.90	304.500	-12.6000
14	10.2900	61.2000	64.7700	28.5600
15	169.800	150.400	12.0000	5.20000
16	26.6400	59.6400	34.4400	15.1200
17	73.3200	44.2200	24.2000	19.5800
18	91.5900	37.4100	68.7300	15.3700
19	167.910	8.58000	26.3900	12.2200
20	37.7300	14.4900	45.3100	37.9500
21	30.0000	52.0000	39.2000	18.4000

ENTRY	P84 26	P94 27	T68 28	T74 29
1	.128000	109.760	9.21200	43.1200
2	9.92000	277.140	53.5800	53.5200
3	.000000	.000000	-26.0000	-22.0000
4	-10.8000	138.400	22.6600	70.2000
5	1.96000	325.640	18.6500	40.8000
6	.600000E-01	453.000	85.4000	65.0000
7	-2.31000	240.660	41.4000	50.3200
8	-9.69000	188.700	78.4700	24.9210
9	14.4000	925.200	166.450	70.8500
10	1.26000	39.2400	2.10000	17.9200
11	.440000	449.900	97.4500	80.8000
12	5.94000	199.980	104.860	31.7200
13	12.6000	5611.90	1035.00	337.800
14	5.61000	387.600	63.1600	71.1400
15	14.8000	345.600	191.800	60.0000
16	6.16000	340.480	59.4240	54.6000
17	-5.50000	173.580	55.9200	53.8400
18	-9.57000	199.810	66.5200	109.200
19	6.11000	174.720	7.79700	98.6000
20	-.690000	262.430	20.6500	64.5600
21	2.40000	242.400	54.4000	51.8000

ENTRY	T78 30	T84 31	T94 32	R68 33
1	21.3720	4.20800	123.360	36.7880
2	25.2300	13.7200	285.120	48.4200
3	9.00000	5.00000	-33.0000	38.0000
4	33.2000	-20.4000	148.600	47.3400
5	42.1400	13.1400	360.900	25.3500
6	11.4000	.860000	477.000	-31.4000
7	38.9700	-.730000	287.270	81.6000
8	53.4000	-10.1800	223.000	3.53000
9	26.4000	16.0500	943.350	-120.450
10	55.3800	9.46000	105.660	52.9000
11	53.0500	2.24000	520.550	1.55000
12	18.3600	7.98000	241.120	-.860000
13	-6.60000	19.5000	5700.70	-982.000
14	30.5200	5.31600	397.890	16.8400
15	11.0800	23.8000	515.400	105.200
16	22.1040	4.00000	367.120	-9.42400
17	27.0680	3.86000	246.900	8.08000
18	21.0500	-12.4100	291.400	38.4800
19	41.8000	23.5100	342.630	7.20300
20	38.7200	6.24000	300.160	78.3500
21	26.8000	4.80000	272.400	9.60000

ENTRY	R74 34	R78 35	R84 36	R94 37
1	5.88000	23.6280	-10.1080	71.6400
2	28.4800	30.7700	-3.72000	250.880
3	[illegible]	[illegible]	[illegible]	[illegible]

6	13.0000	17.6000	-16.8600	-280.000
7	-20.3200	-10.9700	-52.2700	-214.270
8	42.0790	-57.7000	39.1800	52.0000
9	.150000	8.60000	39.9500	-516.350
10	21.0800	-73.3800	-30.4600	-66.6600
11	76.2000	-20.0500	-4.34000	43.4500
12	89.2800	.640000	.720000	240.880
13	-257.800	1.60000	2.50000	-5482.70
14	-4.14000	12.4800	1.28400	-38.8900
15	136.000	-12.8800	5.20000	877.600
16	32.4000	-11.1040	19.0000	-84.1200
17	27.1600	-15.0680	-46.8600	-157.900
18	-29.2000	-22.2500	5.21000	-53.4000
19	113.400	-26.8000	-12.5100	18.3700
20	54.4400	12.2800	-19.2400	174.840
21	29.2000	-1.80000	-3.80000	1.60000

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:val
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 V68 V74 V78 V84 V94 S68 S74 S78 S84 S94 E68 E74 E78 E84 $
E94 SW SP

set W68 1963,1 1963,21 = SW(t)*E68(t)
set W74 1963,1 1963,21 = SW(t)*E74(t)
set W78 1963,1 1963,21 = SW(t)*E78(t)
set W84 1963,1 1963,21 = SW(t)*E84(t)
set W94 1963,1 1963,21 = SW(t)*E94(t)
set P68 1963,1 1963,21 = SP(t)*S68(t)
set P74 1963,1 1963,21 = SP(t)*S74(t)
set P78 1963,1 1963,21 = SP(t)*S78(t)
set P84 1963,1 1963,21 = SP(t)*S84(t)
set P94 1963,1 1963,21 = SP(t)*S94(t)
set T68 1963,1 1963,21 = W68(t)+P68(t)
set T74 1963,1 1963,21 = W74(t)+P74(t)
set T78 1963,1 1963,21 = W78(t)+P78(t)
set T84 1963,1 1963,21 = W84(t)+P84(t)
set T94 1963,1 1963,21 = W94(t)+P94(t)
set R68 1963,1 1963,21 = V68(t)-T68(t)
set R74 1963,1 1963,21 = V74(t)-T74(t)
set R78 1963,1 1963,21 = V78(t)-T78(t)
set R84 1963,1 1963,21 = V84(t)-T84(t)
set R94 1963,1 1963,21 = V94(t)-T94(t)
print 1963,1 1963,21 W68 W74 W78 W84 W94 P68 P74 P78 P84 P94 T68 T74 T78 T84
T94 R68 R74 R78 R84 R94
```

ENTRY	W68 18	W74 19	W78 20	W84 21
1	.684000	-6.08000	-6.84000	-5.32000
2	-.630000	-10.7100	-3.15000	-10.0800
3	-3.60000	-11.7000	-6.30000	-35.1000
4	-8.36000	-16.7200	-12.1600	-38.0000
5	-7.74000	-15.4800	-9.46000	-20.6400
6	5.04000	-16.5600	-3.60000	-10.0800
7	10.5000	-9.10000	-7.00000	-14.0000
8	-1.80000	-1.44000	-9.36000	-19.4400
9	4.86000	-10.5300	-4.05000	.486000
10	-5.85000	-16.9000	-7.80000	-24.0500
11	14.7600	4.10000	-7.38000	-18.0400
12	-1.59000	-1.59000	.530000	-11.1300
13	1.40000	-22.4000	.000000	-1.75000
14	3.32000	-14.1100	-9.96000	-20.7500
15	-1.84000	-12.8800	-8.28000	-49.6800
16	3.36000	.000000	-5.88000	-24.3600
17	6.51000	-18.6000	-4.65000	-10.2300
18	8.37000	-8.37000	-9.30000	-12.0900
19	-8.50000	-5.00000	-4.00000	-36.0000
20	5.46000	-10.1400	-3.90000	-21.0600
21	.332000	-9.96000	-6.64000	-19.9200

ENTRY	W94 22	P68 23	P74 24	P78 25
1	-15.9600	4.80000	9.12000	1.20000
2	-21.4200	12.9500	27.0100	2.22000
3	[illegible]	[illegible]	[illegible]	[illegible]

6	-23.7600	-2.24000	13.1600	5.04000
7	-19.6000	8.10000	17.1000	1.50000
8	-28.0800	5.32000	9.80000	.224000
9	-10.5300	3.42000	4.75000	1.71000
10	-40.3000	-.315000	14.3500	-3.15000
11	-9.84000	19.8000	10.4400	2.34000
12	-13.2500	13.1600	19.2700	3.29000
13	-23.1000	23.4000	-10.2000	20.4000
14	-35.6900	.680000	19.8900	-2.55000
15	-59.8000	.560000	2.88000	.800000
16	-26.8800	2.08000	4.00000	.480000
17	-25.1100	1.40000	1.89000	.490000
18	-20.4600	1.47000	2.73000	.280000
19	-47.0000	.000000	.000000	.000000
20	-27.3000	3.30000	7.26000	.220000
21	-31.5400	3.23000	5.61000	.850000

ENTRY	P84 26	P94 27	T68 28	T74 29
1	1.44000	20.1600	5.48400	3.04000
2	-1.11000	51.0600	12.3200	16.3000
3	6.30000	23.9000	1.00000	-9.20000
4	-3.60000	2.88000	-6.20000	-12.4000
5	-.140000	5.04000	-6.34000	-11.9800
6	-2.80000	12.0400	2.80000	-3.40000
7	.300000	34.2000	18.6000	8.00000
8	-3.36000	11.4800	3.52000	8.36000
9	4.56000	18.6200	8.28000	-5.78000
10	-19.9500	-16.1000	-6.16500	-2.55000
11	-.720000E-01	49.1400	34.5600	14.5400
12	.470000	45.5900	11.5700	17.6800
13	-1.80000	25.5000	24.8000	-32.6000
14	.340000	16.3200	4.00000	5.78000
15	-.800000	3.68000	-1.28000	-10.0000
16	-.320000	6.88000	5.44000	4.00000
17	.420000	5.04000	7.91000	-16.7100
18	.700000E-01	5.39000	9.84000	-5.64000
19	.000000	.000000	-8.50000	-5.00000
20	-1.76000	9.24000	8.76000	-2.88000
21	-.102000	11.2200	3.56200	-4.35000

ENTRY	T78 30	T84 31	T94 32	R68 33
1	-5.64000	-3.88000	4.20000	10.5160
2	-.930000	-11.1900	29.6400	6.68000
3	-4.90000	-28.8000	-23.8000	-5.70000
4	-11.4400	-41.6000	-51.0800	14.6000
5	-9.51600	-20.7800	-37.9600	7.54000
6	1.44000	-12.8800	-11.7200	432.200
7	-5.50000	-13.7000	14.6000	-63.6000
8	-9.13600	-22.8000	-16.6000	23.4800
9	-2.34000	5.04600	8.09000	15.7200
10	-10.9500	-44.0000	-56.4000	9.46500
11	-5.04000	-18.1120	39.3000	6.44000
12	3.82000	-10.6600	32.3400	-3.47000
13	20.4000	-3.55000	2.40000	23.2000
14	-12.5100	-20.4100	-19.3700	1.00000
15	-7.48000	-50.4800	-56.1200	-4.92000
16	-5.40000	-24.6800	-20.0000	7.56000
17	-4.16000	-9.81000	-20.0700	23.0900
18	-9.02000	-12.0200	-15.0700	5.16000
19	-4.00000	-36.0000	-47.0000	12.1000
20	-3.68000	-22.8200	-18.0600	15.2400
21	-5.79000	-20.0220	-20.3200	9.43800

ENTRY	R74 34	R78 35	R84 36	R94 37
1	25.9600	15.5400	16.8800	80.8000
2	-17.4000	17.9300	-3.81000	-12.6400
3	[illegible]	[illegible]	[illegible]	[illegible]

6	38.4000	-10.5400	-8.12000	429.720
7	9.00000	16.5000	-4.30000	-56.6000
8	5.64000	2.03600	20.8000	47.6000
9	.680000	19.3400	15.9540	57.9100
10	6.75000	-1.05000	54.0000	60.8000
11	1.46000	12.5400	25.8120	49.7000
12	-6.68000	11.1800	23.6600	22.6600
13	47.6000	21.6000	117.550	413.600
14	5.22000	24.5100	-36.5900	-23.6300
15	34.0000	-16.5200	6.48000	6.12000
16	5.90000	9.30000	4.68000	52.0000
17	9.41000	18.1600	8.11000	56.0700
18	16.6400	13.8200	18.0200	57.0700
19	17.0000	5.10000	15.0000	39.6000
20	10.3800	6.48000	24.0200	56.0600
21	12.3500	9.79000	13.0220	38.3200

end

```
NORMAL COMPLETION OF JOB
         HALT AT     0
             0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:cor
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 G068 U068 G074 U074 G078 U078 G084 U084 G094 U094 GL68 $
UL68 GL74 UL74 GL78 UL78 GL84 UL84 GL94 UL94 GC68 UC68 GC74 UC74 GC78 UC78 $
GC84 UC84 GC94 UC94 GT68 UT68 GT74 UT74 GT78 UT78 GT84 UT84 GT94 UT94

cmoment(print,corr) 63,1 63,21
# GT68 UT68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    31      GT68
VAR    32      UT68

CORRELATION MATRIX
     VARIABLE              GT68           UT68
            SERIES LAG    31    0         32    0
     GT68        31    0    1.0000       -.61687E-01
     UT68        32    0  -.61687E-01    1.0000


cmoment(print,corr) 63,1 63,21
# GT74 UT74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    33      GT74
VAR    34      UT74

CORRELATION MATRIX
     VARIABLE              GT74           UT74
            SERIES LAG    33    0         34    0
     GT74        33    0    1.0000       -.38054
     UT74        34    0  -.38054         1.0000


cmoment(print,corr) 63,1 63,21
# GT78 UT78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR    35      GT78
VAR    36      UT78

CORRELATION MATRIX
     VARIABLE              GT78           UT78
            SERIES LAG    35    0         36    0
     GT78        35    0    1.0000        .33452
     UT78        36    0    .33452        1.0000


cmoment(print,corr) 63,1 63,21
# GT84 UT84
```

```
VAR   37      GT84
VAR   38      UT84

CORRELATION MATRIX
     VARIABLE              GT84           UT84
           SERIES LAG     37    0        38    0
     GT84        37    0  1.0000         .36799E-01
     UT84        38    0  .36799E-01     1.0000



cmoment(print,corr) 63,1 63,21
# GT94 UT94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   39      GT94
VAR   40      UT94

CORRELATION MATRIX
     VARIABLE              GT94           UT94
           SERIES LAG     39    0        40    0
     GT94        39    0  1.0000        -.68303
     UT94        40    0 -.68303         1.0000



cmoment(print,corr) 63,1 63,21
# GT68 G068

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   31      GT68
VAR    1      G068

CORRELATION MATRIX
     VARIABLE              GT68           G068
           SERIES LAG     31    0         1    0
     GT68        31    0  1.0000         .20704
     G068         1    0  .20704         1.0000



cmoment(print,corr) 63,1 63,21
# UT68 U068

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   32      UT68
VAR    2      U068

CORRELATION MATRIX
     VARIABLE              UT68           U068
           SERIES LAG     32    0         2    0
     UT68        32    0  1.0000         .99383
     U068         2    0  .99383         1.0000



cmoment(print,corr) 63,1 63,21
# GT74 G074

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   33      GT74
VAR    3      G074

CORRELATION MATRIX
     VARIABLE              GT74           G074
           SERIES LAG     33    0         3    0
```

```
cmoment(print,corr) 63,1 63,21
# UT74 U074

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   34      UT74
VAR    4      U074

CORRELATION MATRIX
    VARIABLE              UT74           U074
          SERIES LAG      34    0         4    0
    UT74        34    0   1.0000         .67610
    U074         4    0   .67610         1.0000


cmoment(print,corr) 63,1 63,21
# GT78 G078

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   35      GT78
VAR    5      G078

CORRELATION MATRIX
    VARIABLE              GT78           G078
          SERIES LAG      35    0         5    0
    GT78        35    0   1.0000         .78380
    G078         5    0   .78380         1.0000


cmoment(print,corr) 63,1 63,21
# UT78 U078

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   36      UT78
VAR    6      U078

CORRELATION MATRIX
    VARIABLE              UT78           U078
          SERIES LAG      36    0         6    0
    UT78        36    0   1.0000         .87700
    U078         6    0   .87700         1.0000


cmoment(print,corr) 63,1 63,21
# GT84 G084

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   37      GT84
VAR    7      G084

CORRELATION MATRIX
    VARIABLE              GT84           G084
          SERIES LAG      37    0         7    0
    GT84        37    0   1.0000         .89510
    G084         7    0   .89510         1.0000


cmoment(print,corr) 63,1 63,21
# UT84 U084
```

```
FROM  1963:  1  UNTIL  1983:  1
VAR   38      UT84
VAR    8      U084

CORRELATION MATRIX
    VARIABLE                UT84           U084
          SERIES LAG      38    0          8    0
    UT84        38    0   1.0000          .91038
    U084         8    0   .91038          1.0000


cmoment(print,corr) 63,1 63,21
# GT94 G094

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   39      GT94
VAR    9      G094

CORRELATION MATRIX
    VARIABLE                GT94           G094
          SERIES LAG      39    0          9    0
    GT94        39    0   1.0000          .24954
    G094         9    0   .24954          1.0000


cmoment(print,corr) 63,1 63,21
# UT94 U094

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   40      UT94
VAR   10      U094

CORRELATION MATRIX
    VARIABLE                UT94           U094
          SERIES LAG      40    0          10   0
    UT94        40    0   1.0000          .97596
    U094        10    0   .97596          1.0000


cmoment(print,corr) 63,1 63,21
# GT68 GL68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   31      GT68
VAR   11      GL68

CORRELATION MATRIX
    VARIABLE                GT68           GL68
          SERIES LAG      31    0          11   0
    GT68        31    0   1.0000          .45302
    GL68        11    0   .45302          1.0000


cmoment(print,corr) 63,1 63,21
# UT68 UL68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   32      UT68
VAR   12      UL68

CORRELATION MATRIX
    VARIABLE                UT68           UL68
          SERIES LAG      32    0          12   0
```

```
cmoment(print,corr) 63,1 63,21
# GT74 GL74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   33      GT74
VAR   13      GL74

CORRELATION MATRIX
    VARIABLE               GT74          GL74
          SERIES LAG    33    0        13    0
    GT74       33    0   1.0000        .72654
    GL74       13    0   .72654        1.0000


cmoment(print,corr) 63,1 63,21
# UT74 UL74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   34      UT74
VAR   14      UL74

CORRELATION MATRIX
    VARIABLE               UT74          UL74
          SERIES LAG    34    0        14    0
    UT74       34    0   1.0000        .82274
    UL74       14    0   .82274        1.0000


cmoment(print,corr) 63,1 63,21
# GT78 GL78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   35      GT78
VAR   15      GL78

CORRELATION MATRIX
    VARIABLE               GT78          GL78
          SERIES LAG    35    0        15    0
    GT78       35    0   1.0000        .85825
    GL78       15    0   .85825        1.0000


cmoment(print,corr) 63,1 63,21
# UT78 UL78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   36      UT78
VAR   16      UL78

CORRELATION MATRIX
    VARIABLE               UT78          UL78
          SERIES LAG    36    0        16    0
    UT78       36    0   1.0000        .94900
    UL78       16    0   .94900        1.0000


cmoment(print,corr) 63,1 63,21
# GT84 GL84
```

```
VAR   37      GT84
VAR   17      GL84

CORRELATION MATRIX
    VARIABLE               GT84          GL84
          SERIES LAG   37    0       17    0
    GT84        37    0    1.0000        .98144
    GL84        17    0    .98144        1.0000



cmoment(print,corr) 63,1 63,21
# UT84 UL84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   38      UT84
VAR   18      UL84

CORRELATION MATRIX
    VARIABLE               UT84          UL84
          SERIES LAG   38    0       18    0
    UT84        38    0    1.0000        .96889
    UL84        18    0    .96889        1.0000



cmoment(print,corr) 63,1 63,21
# GT94 GL94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   39      GT94
VAR   19      GL94

CORRELATION MATRIX
    VARIABLE               GT94          GL94
          SERIES LAG   39    0       19    0
    GT94        39    0    1.0000        .38385
    GL94        19    0    .38385        1.0000



cmoment(print,corr) 63,1 63,21
# UT94 UL94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   40      UT94
VAR   20      UL94

CORRELATION MATRIX
    VARIABLE               UT94          UL94
          SERIES LAG   40    0       20    0
    UT94        40    0    1.0000        .98584
    UL94        20    0    .98584        1.0000



cmoment(print,corr) 63,1 63,21
# GT68 GC68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   31      GT68
VAR   21      GC68

CORRELATION MATRIX
    VARIABLE               GT68          GC68
          SERIES LAG   31    0       21    0
```

```
cmoment(print,corr) 63,1 63,21
# UT68 UC68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   32      UT68
VAR   22      UC68

CORRELATION MATRIX
    VARIABLE             UT68          UC68
          SERIES LAG     32   0        22   0
    UT68        32   0   1.0000        .99350
    UC68        22   0   .99350        1.0000


cmoment(print,corr) 63,1 63,21
# GT74 GC74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   33      GT74
VAR   23      GC74

CORRELATION MATRIX
    VARIABLE             GT74          GC74
          SERIES LAG     33   0        23   0
    GT74        33   0   1.0000        .66958
    GC74        23   0   .66958        1.0000


cmoment(print,corr) 63,1 63,21
# UT74 UC74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   34      UT74
VAR   24      UC74

CORRELATION MATRIX
    VARIABLE             UT74          UC74
          SERIES LAG     34   0        24   0
    UT74        34   0   1.0000        .75315
    UC74        24   0   .75315        1.0000


cmoment(print,corr) 63,1 63,21
# GT78 GC78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   35      GT78
VAR   25      GC78

CORRELATION MATRIX
    VARIABLE             GT78          GC78
          SERIES LAG     35   0        25   0
    GT78        35   0   1.0000        .71779
    GC78        25   0   .71779        1.0000


cmoment(print,corr) 63,1 63,21
# UT78 UC78
```

```
VAR   36      UT78
VAR   26      UC78

CORRELATION MATRIX
    VARIABLE              UT78           UC78
          SERIES LAG    36    0        26    0
    UT78         36   0   1.0000       .75106
    UC78         26   0   .75106       1.0000


cmoment(print,corr) 63,1 63,21
# GT84 GC84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   37      GT84
VAR   27      GC84

CORRELATION MATRIX
    VARIABLE              GT84           GC84
          SERIES LAG    37    0        27    0
    GT84         37   0   1.0000       .84109
    GC84         27   0   .84109       1.0000


cmoment(print,corr) 63,1 63,21
# UT84 UC84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   38      UT84
VAR   28      UC84

CORRELATION MATRIX
    VARIABLE              UT84           UC84
          SERIES LAG    38    0        28    0
    UT84         38   0   1.0000       .83144
    UC84         28   0   .83144       1.0000


cmoment(print,corr) 63,1 63,21
# GT94 GC94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   39      GT94
VAR   29      GC94

CORRELATION MATRIX
    VARIABLE              GT94           GC94
          SERIES LAG    39    0        29    0
    GT94         39   0   1.0000       .43862
    GC94         29   0   .43862       1.0000


cmoment(print,corr) 63,1 63,21
# UT94 UC94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   40      UT94
VAR   30      UC94

CORRELATION MATRIX
    VARIABLE              UT94           UC94
```

```
end


          NORMAL COMPLETION OF JOB
                    HALT AT     0
                         0 ERRORS          0 WARNINGS
```

```
open data b:dif
cal 1963 1 1
all 0 1963,15
data 1963.1 1963.15 T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 $
T17 T18 T19 T20 TI
print 1963,1 1963,15 T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 $
T17 T18 T19 T20 TI

ols T1 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE     1       T1
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .22724489       RBAR**2           .16780219
SSR          .10213762            SEE          .88638253E-01
DURBIN-WATSON  1.27141135
Q(    7)=    3.97715        SIGNIFICANCE LEVEL  .782405
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1      CONSTANT    0    0    .2216667E-01   .4357421E-01   .5087106
  2      TI         21    0    .1035714E-01   .5297149E-02   1.955230


ols T2 1963.1 1963,15
# constant TI
```

```
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .06032353      RBAR**2          -.01195927
SSR           .13713012           SEE           .10270575
DURBIN-WATSON  1.51886621
Q(   7)=    6.37657         SIGNIFICANCE LEVEL  .496531
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    .1759167        .5048974E-01    3.484206
  2      TI         21    0  -.5607143E-02    .6137842E-02   -.9135365


ols T3 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE     3      T3
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .00082859      RBAR**2          -.07603075
SSR           .29113190           SEE           .14964880
DURBIN-WATSON  1.88072556
Q(   7)=    4.06794         SIGNIFICANCE LEVEL  .771920
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    .2351667        .7356676E-01    3.196643
  2      TI         21    0  -.9285714E-03    .8943226E-02   -.1038296


ols T4 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE     4      T4
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .33869487      RBAR**2           .28782524
SSR           .13377762           SEE           .10144253
DURBIN-WATSON  1.23522744
Q(   7)=    9.99494         SIGNIFICANCE LEVEL  .188861
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    .1983333E-01    .4986874E-01    .3977107
  2      TI         21    0    .1564286E-01    .6062350E-02    2.580329


ols T5 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE     5      T5
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .74536642      RBAR**2           .72577923
SSR           .10439298           SEE           .896115450E-01
DURBIN-WATSON  1.19210042
Q(   7)=    13.0107         SIGNIFICANCE LEVEL  .718469E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0  -.7658333E-01    .4405268E-01   -1.738449
  2      TI         21    0    .3303571E-01    .5355314E-02    6.168772
```

```
DEPENDENT VARIABLE      6       T6
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS                 15      DEGREES OF FREEDOM      13
R**2               .10386941       RBAR**2           .03493629
SSR           .31355012            SEE           .15530370
DURBIN-WATSON  1.28820165
Q(    7)=    12.5599          SIGNIFICANCE LEVEL  .835864E-01
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************    ************    ************
  1       CONSTANT     0    0    .1129167         .7634669E-01    1.478999
  2       TI          21    0    .1139286E-01     .9281171E-02    1.227524


ols T7 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE      7       T7
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS                 15      DEGREES OF FREEDOM      13
R**2               .80756176       RBAR**2           .79275882
SSR           .14493679            SEE           .10558875
DURBIN-WATSON  1.10003930
Q(    7)=    13.7331          SIGNIFICANCE LEVEL  .561377E-01
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************    ************    ************
  1       CONSTANT     0    0   -.7225000E-01     .5190701E-01   -1.391912
  2       TI          21    0    .4660714E-01     .6310135E-02    7.386077


ols T8 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE      8       T8
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS                 15      DEGREES OF FREEDOM      13
R**2               .00498398       RBAR**2          -.07155571
SSR           .26531107            SEE           .14285848
DURBIN-WATSON  1.09473961
Q(    7)=    34.3967          SIGNIFICANCE LEVEL  .145160E-04
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************    ************    ************
  1       CONSTANT     0    0    .2732500         .7022866E-01    3.890862
  2       TI          21    0   -.2178571E-02     .8537427E-02   -.2551789


ols T9 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE      9       T9
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS                 15      DEGREES OF FREEDOM      13
R**2               .16129678       RBAR**2           .09678115
SSR           .66335833E-01        SEE          .71433580E-01
DURBIN-WATSON  2.43907202
Q(    7)=    10.0703          SIGNIFICANCE LEVEL  .184627
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************    ************    ************
```

```
ols T10 1963,1 1963,15
# constant TI



DEPENDENT VARIABLE   10      T10
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .81784467      RBAR**2           .80383272
SSR          .88100762           SEE          .26032637
DURBIN-WATSON  1.39899250
Q(    7)=    34.6808          SIGNIFICANCE LEVEL  .128397E-04
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0  -.2706667        .1279754       -2.114990
  2      TI         21    0   .1188571        .1555748E-01    7.639873



ols T11 1963,1 1963,15
# constant TI



DEPENDENT VARIABLE   11      T11
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .73509746      RBAR**2           .71472034
SSR          .18164190           SEE          .11820514
DURBIN-WATSON  1.22317433
Q(    7)=    6.36125          SIGNIFICANCE LEVEL  .498257
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0  -.2433333E-01    .5810918E-01  -.4187520
  2      TI         21    0   .4242857E-01    .7064108E-02   6.006218



ols T12 1963,1 1963,15
# constant TI



DEPENDENT VARIABLE   12      T12
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .41475292      RBAR**2           .36973392
SSR          .83479643E-01       SEE          .80134331E-01
DURBIN-WATSON  1.27466683
Q(    7)=    4.78385          SIGNIFICANCE LEVEL  .686322
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  1      CONSTANT    0    0   .3625000E-01    .3939372E-01    .9201974
  2      TI         21    0   .1453571E-01    .4788942E-02   3.035266



ols T13 1963,1 1963,15
# constant TI



DEPENDENT VARIABLE   13      T13
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .28275980      RBAR**2           .22758748
SSR          2.7459111           SEE          .45959104
DURBIN-WATSON  1.24384634
```

```
***     *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0    .2527500        .2259331        1.118694
  2     TI         21    0    .6217857E-01    .2746582E-01    2.263853


ols T14 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE    14      T14
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .39542153      RBAR**2          .34891550
SSR          .51909107           SEE          .19982513
DURBIN-WATSON  1.34972961
Q(    7)=     6.88574        SIGNIFICANCE LEVEL  .440873
NO.     LABEL     VAR  LAG    COEFFICIENT     STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0    .3625000E-01    .9823324E-01    .3690197
  2     TI         21    0    .3482143E-01    .1194184E-01    2.915919


ols T15 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE    15      T15
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .01211317      RBAR**2          -.06387813
SSR          .13468190           SEE          .10178480
DURBIN-WATSON  2.43364754
Q(    7)=     10.4382        SIGNIFICANCE LEVEL  .165071
NO.     LABEL     VAR  LAG    COEFFICIENT     STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0    .8966667E-01    .5003701E-01    1.792007
  2     TI         21    0    .2428571E-02    .6082806E-02    .3992519


ols T16 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE    16      T16
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2              .13714497      RBAR**2          .07077150
SSR          .93510476E-01       SEE          .84812225E-01
DURBIN-WATSON  2.33269814
Q(    7)=     3.20665        SIGNIFICANCE LEVEL  .865250
NO.     LABEL     VAR  LAG    COEFFICIENT     STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1     CONSTANT    0    0    .7433333E-01    .4169335E-01    1.782858
  2     TI         21    0    .7285714E-02    .5068500E-02    1.437450


ols T17 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE    17      T17
FROM  1963:  1  UNTIL  1977:  1
```

```
SSR            .29561762          SEE           .15079727
DURBIN-WATSON   1.29069946
Q(    7)=    6.65704         SIGNIFICANCE LEVEL  .465440
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1     CONSTANT     0    0    .8833333E-02    .7413134E-01    .1191579
  2     TI          21    0    .4235714E-01    .9011861E-02   4.700155


ols T18 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE   18      T18
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .38090902      RBAR**2           .33328664
SSR           .13541583           SEE           .10206176
DURBIN-WATSON   1.18332451
Q(    7)=    16.1207         SIGNIFICANCE LEVEL  .240361E-01
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1     CONSTANT     0    0    .1125833        .5017316E-01   2.243896
  2     TI          21    0    .1725000E-01    .6099357E-02   2.828167


ols T19 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE   19      T19
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .57176351      RBAR**2           .53882224
SSR           .17291048           SEE           .11532912
DURBIN-WATSON   1.94866763
Q(    7)=    9.43834         SIGNIFICANCE LEVEL  .222697
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1     CONSTANT     0    0   -.6333333E-02    .5669534E-01  -.1117082
  2     TI          21    0    .2871429E-01    .6892233E-02   4.166180


ols T20 1963,1 1963,15
# constant TI


DEPENDENT VARIABLE   20      T20
FROM  1963:  1  UNTIL  1977:  1
OBSERVATIONS              15      DEGREES OF FREEDOM      13
R**2               .15015367      RBAR**2           .08478088
SSR           .20698857           SEE           .12618319
DURBIN-WATSON   1.53735196
Q(    7)=    7.69135         SIGNIFICANCE LEVEL  .360596
NO.      LABEL      VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******     ***  ***   ************   ************   ************
  1     CONSTANT     0    0    .4600000E-01    .6203116E-01    .7415628
  2     TI          21    0    .1142857E-01    .7540888E-02   1.515547


end
```

```
NORMAL COMPLETION OF JOB
          HALT AT      0
              0 ERRORS          0 WARNINGS
```

APPENDIX SEVEN
STATISTICAL APPENDIX FOR CHAPTER SIX

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:impG
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 E63 E64 E65 E66 E67 E68 E69 E70 E71 E72 E73 E74 E75 E76 $
E77 E78 E79 E80 E81 E82 E83 E84


set EX63 1963,1 1963,21 = ((E63(t)/1000)/42323.673)*100
set EX64 1963,1 1963,21 = ((E64(t)/1000)/48094.109)*100
set EX65 1963,1 1963,21 = ((E65(t)/1000)/60632.468)*100
set EX66 1963,1 1963,21 = ((E66(t)/1000)/64924.392)*100
set EX67 1963,1 1963,21 = ((E67(t)/1000)/65350.523)*100
set EX68 1963,1 1963,21 = ((E68(t)/1000)/93664.184)*100
set EX69 1963,1 1963,21 = ((E69(t)/1000)/77755.895)*100
set EX70 1963,1 1963,21 = ((E70(t)/1000)/80966.089)*100
set EX71 1963,1 1963,21 = ((E71(t)/1000)/78588.418)*100
set EX72 1963,1 1963,21 = ((E72(t)/1000)/87439.783)*100
set EX73 1963,1 1963,21 = ((E73(t)/1000)/104111.330)*100
set EX74 1963,1 1963,21 = ((E74(t)/1000)/92717.106)*100
set EX75 1963,1 1963,21 = ((E75(t)/1000)/92847.489)*100
set EX76 1963,1 1963,21 = ((E76(t)/1000)/103910.449)*100
set EX77 1963,1 1963,21 = ((E77(t)/1000)/109793.282)*100
set EX78 1963,1 1963,21 = ((E78(t)/1000)/113339.191)*100
set EX79 1963,1 1963,21 = ((E79(t)/1000)/110866.130)*100
set EX80 1963,1 1963,21 = ((E80(t)/1000)/118461.815)*100
set EX81 1963,1 1963,21 = ((E81(t)/1000)/104210.068)*100
set EX82 1963,1 1963,21 = ((E82(t)/1000)/110933.524)*100
set EX83 1963,1 1963,21 = ((E83(t)/1000)/119663.226)*100
set EX84 1963,1 1963,21 = ((E84(t)/1000)/121712.716)*100
print 1963,1 1963,21 EX63 EX64 EX65 EX66 EX67 EX68 EX69 EX70 EX71 EX72 EX73 $
EX74 EX75 EX76 EX77 EX78 EX79 EX80 EX81 EX82 EX83 EX84
```

ENTRY	EX63 23	EX64 24	EX65 25	EX66 26
1	12.7243	12.8905	14.1629	12.2860
2	.132250	.113536	.141832	.243340
3	.114995E-01	.204807E-01	.198491E-01	.165146E-01
4	8.41712	7.69028	7.80503	8.06258
5	.802282	.892321	.627368	.910823
6	3.65536	3.26967	3.45480	3.92800
7	.659678E-01	.967644E-01	.123815	.143391
8	3.51903	3.31969	3.26428	3.18634
9	.199683	.276491	.215454	.261540
10	.119706	.110419	.112598	.115266
11	1.83583	1.83972	1.67599	1.55879
12	14.4148	13.1145	12.0517	12.9803
13	4.34024	3.44391	4.62773	3.32250
14	1.64817	1.77516	1.78498	1.78427
15	8.62088	8.75069	8.28538	8.40196
16	4.03914	4.94836	5.92695	4.76838
17	16.0813	17.5463	17.6469	16.0931
18	8.09292	8.17411	7.75271	6.74644
19	8.63290	9.28764	7.94795	12.6412
20	[illegible]	[illegible]	[illegible]	[illegible]

ENTRY	EX67 27	EX68 28	EX69 29	EX70 30
1	12.8973	11.5669	11.1831	12.5764
2	.305366	.301833	.292541	.195176
3	.138499E-01	.138452E-01	.157313E-01	.384655E-01
4	7.83450	6.79581	6.97087	5.91418
5	.704903	.602231	.500645	.406496
6	3.25136	3.07730	2.75405	2.59168
7	.131310	.180394	.130508	.113045
8	3.41983	3.24447	3.12688	3.45622
9	.279695	.256911	.279846	.293372
10	.979610E-01	.892262E-01	.154550	1.36654
11	1.82308	1.83130	1.66169	1.47791
12	13.4027	12.2508	13.6332	12.9568
13	3.36984	3.26016	3.16910	2.82280
14	1.95043	1.51224	1.79250	1.92431
15	7.51661	6.75416	7.90633	8.22702
16	4.50922	6.29202	4.80153	4.13893
17	16.9218	17.8167	17.9628	20.5884
18	9.12248	8.86421	8.30154	8.53979
19	9.78456	12.8397	12.5875	9.77419
20	2.66317	2.44973	2.77500	2.59832
21	100.000	100.000	100.000	100.000

ENTRY	EX71 31	EX72 32	EX73 33	EX74 34
1	12.2448	10.7948	11.8939	8.60141
2	.222352	.226380	.398780	.298875
3	.517990E-01	.505845E-01	.426274E-01	.510467E-01
4	6.22737	5.69490	5.84468	5.89737
5	.354921	.389585	.486952	.597718
6	2.29941	2.19333	2.20447	1.90048
7	.123541	.995748E-01	.133275	.948466E-01
8	3.68869	3.26074	3.08028	4.14515
9	.272240	.265608	.179412	.199040
10	1.25065	1.21639	1.26759	1.31818
11	1.43514	1.32546	1.29297	1.24559
12	13.7635	13.5739	13.1976	14.4461
13	3.64883	3.90562	2.77630	2.78577
14	1.52214	1.35738	1.33091	1.21188
15	7.30459	7.66172	9.57789	12.0613
16	4.18904	4.40761	3.94629	3.76517
17	20.4651	22.7552	19.7684	20.4916
18	7.84888	8.36891	7.82272	8.31176
19	10.2868	9.74601	12.3265	10.3897
20	2.80022	2.70627	2.42845	2.18700
21	100.000	100.000	100.000	100.000

ENTRY	EX75 35	EX76 36	EX77 37	EX78 38
1	9.88673	10.8096	10.6438	11.2470
2	.202145	.239448	.246833	.295720
3	.535168E-01	.760106E-01	.108117	.188119
4	6.50935	5.60119	6.78669	5.33349
5	.475749	.570019	.679124	.778373
6	1.51347	1.59403	1.45876	1.49634
7	.101585	.113670	.123448	.155077
8	4.97191	4.15126	3.45680	2.93465
9	.242395	.269999	.257010	.295876
10	1.12073	1.41706	1.29591	1.23309
11	1.37476	1.39585	1.43412	1.40978
12	16.1330	15.2985	14.1902	13.3908
13	3.14595	4.49650	3.51231	4.52681
14	1.48159	1.37727	1.53099	1.80473
15	8.95524	7.69278	7.55713	8.57175
16	3.08351	2.80084	3.21356	3.44540
17	20.4902	17.4232	16.9616	14.5244
18	7.72697	6.83473	6.97758	7.45380
19	9.65526	14.9319	16.5247	17.7536
20	2.87539	2.90617	3.04177	[illegible]

ENTRY	EX79 39	EX80 40	EX81 41	EX82 42
1	11.6913	10.3064	13.1516	15.0536
2	.345988	.308837	.265870	.463219
3	.267717	.285885	.470020	.604945
4	5.08812	5.01396	7.66783	6.59975
5	.922693	1.36901	1.44995	1.53057
6	1.70454	1.34741	1.16803	1.22470
7	.188390	.157287	.256418	.371984
8	2.02154	3.10693	3.47031	3.87487
9	.297977	.297361	.286143	.254309
10	1.30184	1.03081	5.03008	4.37256
11	1.38265	1.38757	1.70223	1.51249
12	15.1785	14.7189	15.7075	13.7477
13	2.97368	2.41703	2.05555	1.54510
14	2.09750	1.79294	1.72565	1.72764
15	8.24851	9.43150	7.51903	7.03079
16	3.76762	3.37459	4.05655	3.60276
17	16.7777	15.1792	14.2241	13.8761
18	7.92985	7.53899	6.72665	6.88566
19	14.4655	17.4262	9.73034	12.1187
20	3.34847	3.50926	3.33623	3.60255
21	100.000	100.000	100.000	100.000

ENTRY	EX83 43	EX84 44
1	16.2670	15.9175
2	.490125	.476377
3	.674027	.680287
4	6.44077	7.19767
5	1.71461	1.82739
6	1.28036	1.25516
7	.229941	.189019
8	3.51055	3.74566
9	.223128	.266785
10	4.52492	3.75782
11	1.48131	1.54788
12	13.9981	14.9051
13	2.01299	3.53551
14	1.55325	1.56250
15	8.61505	7.53720
16	3.34198	3.31127
17	13.9676	13.8873
18	6.53682	6.33374
19	9.61760	8.59706
20	3.51981	3.46869
21	100.000	100.000

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -     60
OPE -     10
DAT -    200
MAT -     30
GLO -    500
LOC -      0
CON -    200
COM -    300
SER -    100
open data b:impU
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 E63 E68 E70 E71 E72 E73 E74 E75 E76 E78 E79 E81 E82 E83 E8

set EX63 1963,1 1963,21 = (E63(t)/7584)*100
set EX68 1963,1 1963,21 = (E68(t)/11982)*100
set EX70 1963,1 1963,21 = (E70(t)/12799)*100
set EX71 1963,1 1963,21 = (E71(t)/13376)*100
set EX72 1963,1 1963,21 = (E72(t)/15130)*100
set EX73 1963,1 1963,21 = (E73(t)/17493)*100
set EX74 1963,1 1963,21 = (E74(t)/16392)*100
set EX75 1963,1 1963,21 = (E75(t)/14642)*100
set EX76 1963,1 1963,21 = (E76(t)/16003)*100
set EX78 1963,1 1963,21 = (E78(t)/18506)*100
set EX79 1963,1 1963,21 = (E79(t)/20657)*100
set EX81 1963,1 1963,21 = (E81(t)/18899)*100
set EX82 1963,1 1963,21 = (E82(t)/20207)*100
set EX83 1963,1 1963,21 = (E83(t)/22546)*100
set EX84 1963,1 1963,21 = (E84(t)/24723)*100
print 1963,1 1963,21 EX63 EX68 EX70 EX71 EX72 EX73 EX74 EX75 EX76 EX78 EX79 $
EX81 EX82 EX83 EX84
```

ENTRY	EX63 16	EX68 17	EX70 18	EX71 19
1	28.6129	18.6613	20.5250	20.0583
2	1.67458	1.50225	1.35167	1.60736
3	.659283E-01	.834585E-01	.937573E-01	.134569
4	8.53112	6.67668	5.46136	6.06310
5	2.50527	2.57052	2.14079	2.59420
6	.329641	.258721	.234393	.261663
7	6.85654	5.34135	4.87538	4.69498
8	7.41034	5.79202	6.31299	5.68182
9	.698840	.659322	.664114	.717703
10	.975738	.709397	.578170	.613038
11	.936181	.801202	.836003	.919557
12	8.00369	7.50292	8.53192	8.32087
13	5.63027	4.98247	3.57840	3.60347
14	.883439	.776164	.992265	.919557
15	10.2453	10.4240	11.2743	9.00120
16	1.89873	9.18878	7.41464	7.83493
17	8.72890	10.5325	11.5322	11.0870
18	2.76899	5.12435	7.01617	7.07984
19	2.24156	7.55300	5.68794	7.79007
20	1.00211	.859623	.898508	1.01675
21	100.000	100.000	100.000	100.000

ENTRY	EX72 20	EX73 21	EX74 22	EX75 23
1	18.4931	16.7038	13.9336	14.6974
2	1.79114	2.10942	1.59224	1.50936
3	.145406	.137198	.122011	.109275
4	6.12029	5.96238	5.75281	5.60033
5	2.62393	2.72109	2.58053	2.98456
6	.218110	.205797	.237921	.170742
7	4.54726	5.66512	4.98414	3.66753
8	5.59815	4.84765	6.28355	5.36812
9	[illegible]	[illegible]	[illegible]	[illegible]

11	1.03767	1.05757	1.23841	1.23617
12	8.13615	7.67164	10.0720	8.79661
13	3.06015	3.16698	5.03904	4.74662
14	.991408	.937518	1.09200	.990302
15	8.12293	8.33476	10.1818	8.66002
16	8.03701	8.52913	8.17472	9.69813
17	10.8394	11.0787	10.7613	12.2251
18	8.22208	9.23798	8.43094	8.55074
19	9.56378	9.15795	7.32064	8.89223
20	1.09716	1.21191	1.14080	.901516
21	100.000	100.000	100.000	100.000

ENTRY	EX76 24	EX78 25	EX79 26	EX81 27
1	14.5348	11.4990	9.99661	9.40261
2	1.33100	1.40495	1.54911	1.48156
3	.124977	.129688	.121024	.121700
4	5.92389	6.05749	5.81401	5.65109
5	2.95570	3.03685	3.37416	3.55574
6	.149972	.210742	.213003	.179904
7	4.01175	3.49616	3.62589	3.11657
8	5.48647	4.60932	4.42949	4.91560
9	.587390	.599805	.624486	.735489
10	.668625	.724089	.885898	.798984
11	1.23727	1.51843	1.57332	1.60326
12	9.39199	10.1048	10.3113	10.2598
13	4.83659	3.80958	4.15840	5.25425
14	.912329	1.13477	1.21024	1.15879
15	8.50466	7.10040	7.40185	10.2598
16	8.37968	4.90111	5.34928	2.42341
17	11.2479	12.3041	11.9088	12.0800
18	8.72336	9.76440	9.82718	12.2969
19	10.0606	16.4919	16.5222	13.3340
20	.931075	1.10235	1.10374	1.37044
21	100.000	100.000	100.000	100.000

ENTRY	EX82 28	EX83 29	EX84 30
1	9.14040	9.54937	9.15746
2	1.43515	1.42376	1.39142
3	.148463	.119755	.133479
4	5.40407	5.03415	4.99535
5	3.38002	3.33540	3.45023
6	.168259	.150803	.153703
7	2.94452	3.46403	3.17923
8	4.58257	4.17812	4.34818
9	.737368	.714096	.744246
10	.673034	.643130	.679529
11	1.72712	2.58139	2.52397
12	10.3034	9.74452	9.99879
13	5.21601	4.53295	6.73462
14	1.21245	1.24634	1.24580
15	8.77914	8.69334	7.24427
16	2.39026	2.21325	2.28937
17	11.9464	15.8254	16.4260
18	13.6586	11.0574	11.1839
19	14.8909	14.4505	13.1093
20	1.26194	1.04231	1.01120
21	100.000	100.000	100.000

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -     60
OPE -     10
DAT -    200
MAT -     30
GLO -    500
LOC -      0
CON -    200
COM -    300
SER -    100
open data b:impG
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 I63 I64 I65 I66 I67 I68 I69 I70 I71 I72 I73 I74 I75 I76 $
I77 I78 I79 I80 I81 I82 I83 I84 IM63 IM68 IM70 IM71 IM72 IM73 IM74 IM75 IM76 $
IM78 IM79 IM81 IM82 IM83 IM84


set GR68 1963,1 1963,21 = ((I68(t)/I63(t))-1)*100
set GR74 1963,1 1963,21 = ((I74(t)/I68(t))-1)*100
set GR78 1963,1 1963,21 = ((I78(t)/I74(t))-1)*100
set GR84 1963,1 1963,21 = ((I84(t)/I78(t))-1)*100
set GR94 1963,1 1963,21 = ((I84(t)/I63(t))-1)*100
set G68 1963,1 1963,21 = ((IM68(t)/IM63(t))-1)*100
set G74 1963,1 1963,21 = ((IM74(t)/IM68(t))-1)*100
set G78 1963,1 1963,21 = ((IM78(t)/IM74(t))-1)*100
set G84 1963,1 1963,21 = ((IM84(t)/IM78(t))-1)*100
set G94 1963,1 1963,21 = ((IM84(t)/IM63(t))-1)*100
print 1963,1 1963,21 GR68 GR74 GR78 GR84 GR94 G68 G74 G78 G84 G94
```

ENTRY	GR68 38	GR74 39	GR78 40	GR84 41
1	101.174	-26.3894	59.8403	51.9832
2	405.081	-1.98119	20.9518	72.9917
3	166.448	264.968	350.489	288.344
4	78.6766	-14.0980	10.5538	44.9225
5	66.1218	-1.75296	59.1885	152.115
6	86.3077	-38.8665	-3.75314	-9.92070
7	505.176	-47.9543	99.8692	30.8922
8	104.038	26.4686	-13.4562	37.0657
9	184.730	-23.3093	81.7149	-3.17077
10	64.9554	1362.40	14.3519	227.262
11	120.759	-32.6713	38.3555	17.9076
12	88.0816	16.7271	13.3118	19.5324
13	66.2324	-15.4152	98.6406	-16.1282
14	103.053	-20.6724	82.0432	-7.02548
15	73.3843	76.7704	-13.1249	-5.57292
16	244.740	-40.7646	11.8601	3.20738
17	145.187	13.8506	-13.3557	2.67808
18	142.396	-7.18058	9.62387	-8.74884
19	229.146	-19.9000	108.884	-47.9980
20	104.844	-11.6276	76.6995	17.8304
21	121.304	-1.01114	22.2419	7.38802

ENTRY	GR94 42	G68 43	G74 44	G78 45
1	259.744	3.04147	2.14669	-6.83012
2	935.876	41.7323	45.0000	-.383142
3	16912.5	100.000	100.000	20.0000
4	145.912	23.6476	17.8750	18.8759
5	555.022	62.1053	37.3377	32.8605
6	-1.25346	24.0000	25.8065	.000000
7	723.997	23.0769	27.6563	-20.8078
8	206.097	23.4875	48.4150	-17.1845
9	284.214	49.0566	15.1899	21.9780
10	8927.60	14.8649	-2.35294	61.4458
11	142.469	35.2113	111.458	38.4236
12	[illegible]	[illegible]	[illegible]	[illegible]

15	151.427	60.7465	33.6269	-21.2702
16	135.754	664.583	21.7075	-32.3134
17	148.342	90.6344	39.7781	29.0816
18	125.065	192.381	125.081	30.7525
19	186.382	432.353	32.5967	154.333
20	276.905	35.5263	81.5534	9.09091
21	187.576	57.9905	36.8052	12.8965

ENTRY	G84 46	G94 47
1	6.39098	4.33180
2	32.3077	170.866
3	37.5000	560.000
4	10.1695	90.8810
5	51.7794	348.947
6	-2.56410	52.0000
7	21.4838	51.1538
8	26.0258	91.2811
9	65.7658	247.170
10	25.3731	127.027
11	122.064	778.873
12	32.1925	307.249
13	136.170	289.930
14	46.6667	359.701
15	36.3014	130.502
16	-37.5965	293.056
17	78.3487	513.444
18	53.0160	1216.67
19	6.19266	1806.47
20	22.5490	228.947
21	33.5945	225.989

cmoment(print,corr) 63,1 63,21
GR68 G68

VARIABLES IN CROSS-MOMENT MATRIX
FROM 1963: 1 UNTIL 1983: 1
VAR 38 GR68
VAR 43 G68

CORRELATION MATRIX

VARIABLE	SERIES	LAG	GR68 38 0	G68 43 0
GR68	38	0	1.0000	.23313
G68	43	0	.23313	1.0000

cmoment(print,corr) 63,1 63,21
GR74 G74

VARIABLES IN CROSS-MOMENT MATRIX
FROM 1963: 1 UNTIL 1983: 1
VAR 39 GR74
VAR 44 G74

CORRELATION MATRIX

VARIABLE	SERIES	LAG	GR74 39 0	G74 44 0
GR74	39	0	1.0000	-.24621
G74	44	0	-.24621	1.0000

cmoment(print,corr) 63,1 63,21
GR78 G78

VARIABLES IN CROSS-MOMENT MATRIX

```
VAR    45      G78

CORRELATION MATRIX
    VARIABLE              GR78          G78
         SERIES LAG       40    0       45    0
    GR78        40    0   1.0000        .16732
    G78         45    0   .16732        1.0000



cmoment(print,corr) 63,1 63,21
# GR84 G84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   41      GR84
VAR   46      G84

CORRELATION MATRIX
    VARIABLE              GR84          G84
         SERIES LAG       41    0       46    0
    GR84        41    0   1.0000        -.67658E-01
    G84         46    0  -.67658E-01    1.0000



cmoment(print,corr) 63,1 63,21
# GR94 G94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   42      GR94
VAR   47      G94

CORRELATION MATRIX
    VARIABLE              GR94          G94
         SERIES LAG       42    0       47    0
    GR94        42    0   1.0000        .15012E-01
    G94         47    0   .15012E-01    1.0000


end

          NORMAL COMPLETION OF JOB
                   HALT AT      0
                          0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:expU
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 E63 E68 E70 E71 E72 E73 E74 E75 E76 E78 E79 E81 E82 E83 E8


set EX63 1963,1 1963,21 = (E63(t)/8041)*100
set EX68 1963,1 1963,21 = (E68(t)/9755)*100
set EX70 1963,1 1963,21 = (E70(t)/11701)*100
set EX71 1963,1 1963,21 = (E71(t)/12675)*100
set EX72 1963,1 1963,21 = (E72(t)/12978)*100
set EX73 1963,1 1963,21 = (E73(t)/14670)*100
set EX74 1963,1 1963,21 = (E74(t)/15425)*100
set EX75 1963,1 1963,21 = (E75(t)/15492)*100
set EX76 1963,1 1963,21 = (E76(t)/16880)*100
set EX78 1963,1 1963,21 = (E78(t)/17856)*100
set EX79 1963,1 1963,21 = (E79(t)/17729)*100
set EX81 1963,1 1963,21 = (E81(t)/16142)*100
set EX82 1963,1 1963,21 = (E82(t)/16247)*100
set EX83 1963,1 1963,21 = (E83(t)/16244)*100
set EX84 1963,1 1963,21 = (E84(t)/17469)*100
print 1963,1 1963,21 EX63 EX68 EX70 EX71 EX72 EX73 EX74 EX75 EX76 EX78 EX79 $
 EX81 EX82 EX83 EX84
```

ENTRY	EX63 16	EX68 17	EX70 18	EX71 19
1	3.30805	3.04459	2.67499	2.76134
2	2.35045	3.53665	3.06811	3.17160
3	.472578	.522809	.538416	.497041
4	9.43912	8.09841	6.85412	6.22485
5	1.56697	2.55254	1.57252	1.38067
6	.621813E-01	.615069E-01	.854628E-01	.788955E-01
7	.223853	.235777	.324759	.347140
8	1.13170	1.08662	1.12811	1.10454
9	1.75351	2.09124	1.05974	1.07298
10	.882975	1.03537	.811896	.749507
11	1.59184	1.52742	1.75199	1.70414
12	9.53861	11.7786	10.9478	10.7456
13	3.50703	3.25987	2.44424	2.50888
14	1.69133	1.78370	1.73489	1.75937
15	7.27521	7.77037	8.22152	7.33728
16	5.07400	4.47975	8.19588	8.89152
17	19.1270	18.6161	20.2205	20.8126
18	8.12088	7.16556	8.34971	8.30769
19	21.2163	19.7540	18.6651	19.2505
20	1.66646	1.59918	1.35031	1.29389
21	100.000	100.000	100.000	100.000

ENTRY	EX72 20	EX73 21	EX74 22	EX75 23
1	3.12837	3.50375	3.39060	3.72450
2	3.03591	2.76755	2.63209	2.49161
3	.531669	.504431	.447326	.561580
4	6.32609	6.75528	6.28201	5.02195
5	1.36385	1.29516	1.29660	1.24580
6	.693481E-01	.613497E-01	.648298E-01	.516396E-01
7	.377562	.402181	.505673	.509941
8	[illegible]	[illegible]	[illegible]	[illegible]

11	1.61042	1.59509	1.67261	1.77511
12	11.0264	11.3361	14.1588	12.0449
13	2.45030	2.99932	4.73258	4.02789
14	1.74911	1.73824	1.71151	1.73638
15	6.61119	6.76210	6.65154	5.85463
16	9.65480	11.7178	10.0097	9.70824
17	19.6101	17.7914	17.4781	19.9522
18	8.76869	8.67076	9.03079	10.0245
19	19.3019	17.8119	15.5656	17.4671
20	1.24827	1.26108	1.30956	1.03279
21	100.000	100.000	100.000	100.000

ENTRY	EX76 24	EX78 25	EX79 26	EX81 27
1	3.64336	3.76344	3.16431	3.14087
2	2.32820	2.67697	2.56642	2.53996
3	.539100	.610439	.659936	.885888
4	5.24882	5.26434	5.12155	4.29934
5	1.43957	1.82012	1.87828	1.73461
6	.533175E-01	.728047E-01	.676857E-01	.681452E-01
7	.627962	.761649	.721981	.600917
8	1.27962	1.34409	1.32551	1.22661
9	.924171	1.13127	1.14502	1.22661
10	.716825	.694444	.744543	.607112
11	1.84834	1.80332	1.82187	1.95763
12	12.8910	14.1857	14.8514	14.9176
13	4.91706	3.27621	4.26420	5.40206
14	1.63507	1.84812	1.75983	1.71602
15	5.53318	5.72357	6.18760	8.79693
16	10.2844	5.50515	6.22709	2.88688
17	18.2583	19.1756	17.9424	19.1116
18	10.0592	10.7639	10.3446	10.9652
19	16.7476	18.4252	18.1285	16.9620
20	1.02488	1.15367	1.07733	.954033
21	100.000	100.000	100.000	100.000

ENTRY	EX82 28	EX83 29	EX84 30
1	3.08980	4.04457	3.74950
2	2.67742	2.58557	2.42143
3	.892472	.923418	.772798
4	4.03767	3.81064	3.84109
5	1.56952	1.69909	1.68298
6	.677048E-01	.738734E-01	.801420E-01
7	.590878	.609456	.589616
8	1.23100	1.28663	1.39676
9	1.24331	1.28047	1.36814
10	.578568	.609456	.709829
11	1.85880	2.69022	2.59889
12	15.3567	15.0025	15.5075
13	5.55179	5.96528	5.62139
14	1.58183	1.90224	1.85471
15	8.05687	8.72322	8.24317
16	2.80052	2.40089	2.39281
17	19.1728	20.5245	21.4609
18	12.1438	10.8840	11.1626
19	16.5938	14.1591	13.7329
20	.904782	.824920	.812869
21	100.000	100.000	100.000

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:expG
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 I63 I64 I65 I66 I67 I68 I69 I70 I71 I72 I73 I74 I75 I76 $
I77 I78 I79 I80 I81 I82 I83 I84 IM63 IM68 IM70 IM71 IM72 IM73 IM74 IM75 IM76 $
IM78 IM79 IM81 IM82 IM83 IM84

set GR68 1963,1 1963,21 = ((I68(t)/I63(t))-1)*100
set GR74 1963,1 1963,21 = ((I74(t)/I68(t))-1)*100
set GR78 1963,1 1963,21 = ((I78(t)/I74(t))-1)*100
set GR84 1963,1 1963,21 = ((I84(t)/I78(t))-1)*100
set GR94 1963,1 1963,21 = ((I84(t)/I63(t))-1)*100
set G68 1963,1 1963,21 = ((IM68(t)/IM63(t))-1)*100
set G74 1963,1 1963,21 = ((IM74(t)/IM68(t))-1)*100
set G78 1963,1 1963,21 = ((IM78(t)/IM74(t))-1)*100
set G84 1963,1 1963,21 = ((IM84(t)/IM78(t))-1)*100
set G94 1963,1 1963,21 = ((IM84(t)/IM63(t))-1)*100
print 1963,1 1963,21 GR68 GR74 GR78 GR84 GR94 G68 G74 G78 G84 G94
```

ENTRY	GR68 38	GR74 39	GR78 40	GR84 41
1	51.7644	73.8778	48.9057	22.7429
2	108.386	-.660548	30.2325	-18.2886
3	-23.0939	-13.6658	-.703357	-20.9910
4	18.9977	136.159	23.2470	28.1247
5	662.490	757.462	91.7764	102.750
6	26.9199	1247.92	6.21014	-1.71404
7	745.766	39.7851	193.239	-50.0023
8	263.475	193.161	-16.3472	157.660
9	-.255000	81.4799	-13.5880	133.017
10	68.5741	117.398	12.4413	-8.15902
11	74.7461	419.048	64.2048	25.1351
12	622.785	63.0360	37.0497	38.7810
13	772.375	1389.11	41.4208	21.2836
14	209.535	981.016	104.510	7.74464
15	5332.78	278.959	-13.3522	29.2787
16	165.958	691.846	20.5618	34.1177
17	-39.7174	918.745	16.5575	88.6835
18	252.504	469.596	82.1582	-15.0073
19	-65.3930	476.677	10.2550	23.6402
20	119.271	14.4654	47.9241	56.2449
21	41.8087	136.370	31.6528	28.5303

ENTRY	GR94 42	G68 43	G74 44	G78 45
1	382.305	11.6541	76.0943	28.4895
2	120.289	82.5397	17.6812	17.7340
3	-47.9099	34.2105	35.2941	57.9710
4	343.763	4.08432	22.6582	-2.99278
5	25321.7	97.6190	-19.6787	62.5000
6	1685.88	20.0000	66.6667	30.0000
7	1633.33	27.7778	239.130	74.3590
8	2196.72	16.4835	106.604	9.58904
9	264.486	44.6809	-30.8824	43.2624
10	278.451	42.2535	10.8911	10.7143
11	1763.72	16.4063	73.1544	24.8062
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

15	22962.1	29.5726	35.3562	-.389864
16	3305.26	7.10784	253.318	-36.3342
17	1250.62	18.0754	48.4581	27.0030
18	3008.57	7.04441	99.2847	37.9756
19	172.054	12.9543	24.5978	37.0262
20	480.098	16.4179	29.4872	1.98020
21	467.193	21.3158	58.1240	15.7601

ENTRY	G84 46	G94 47
1	-2.52976	146.241
2	-11.5063	123.810
3	23.8532	255.263
4	-28.6170	-11.5942
5	-9.53846	133.333
6	7.69231	180.000
7	-24.2647	472.222
8	1.66667	168.132
9	18.3168	69.5035
10	.000000	74.6479
11	40.9938	254.688
12	6.94828	253.194
13	67.8632	248.227
14	-1.81818	138.235
15	40.9002	146.154
16	-57.4771	2.45098
17	9.49182	143.758
18	1.45682	198.622
19	-27.0821	40.6213
20	-31.0680	5.97015
21	-2.16734	117.249

```
cmoment(print,corr) 63,1 63,21
# GR68 G68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   38      GR68
VAR   43      G68

CORRELATION MATRIX
    VARIABLE              GR68          G68
          SERIES LAG     38    0       43    0
    GR68        38   0   1.0000        .77161E-01
    G68         43   0   .77161E-01    1.0000


cmoment(print,corr) 63,1 63,21
# GR74 G74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   39      GR74
VAR   44      G74

CORRELATION MATRIX
    VARIABLE              GR74          G74
          SERIES LAG     39    0       44    0
    GR74        39   0   1.0000        .15692
    G74         44   0   .15692        1.0000


cmoment(print,corr) 63,1 63,21
# GR78 G78

VARIABLES IN CROSS-MOMENT MATRIX
```

```
VAR   45      G78

CORRELATION MATRIX
    VARIABLE              GR78            G78
         SERIES LAG    40    0         45    0
    GR78       40    0    1.0000          .44197
    G78        45    0    .44197          1.0000


cmoment(print,corr) 63,1 63,21
# GR84 G84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   41      GR84
VAR   46      G84

CORRELATION MATRIX
    VARIABLE              GR84            G84
         SERIES LAG    41    0         46    0
    GR84       41    0    1.0000          .46948E-01
    G84        46    0    .46948E-01     1.0000


cmoment(print,corr) 63,1 63,21
# GR94 G94

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   42      GR94
VAR   47      G94

CORRELATION MATRIX
    VARIABLE              GR94            G94
         SERIES LAG    42    0         47    0
    GR94       42    0    1.0000          .11171
    G94        47    0    .11171          1.0000


end

          NORMAL COMPLETION OF JOB
                HALT AT      0
                     0 ERRORS          0 WARNINGS
```

```
open data b:per
cal 1963 1 1
all 0 1963,20
data 1963,1 1963,20 GG63 GU63 GG68 GU68 GG74 GU74 GG78 GU78 GG84 GU84 XG63 $
XU63 XG68 XU68 XG74 XU74 XG78 XU78 XG84 XU84
print 1963,1 1963,20 GG63 GU63 GG68 GU68 GG74 GU74 GG78 GU78 GG84 GU84 XG63 $
XU63 XG68 XU68 XG74 XU74 XG78 XU78 XG84 XU84
```

ENTRY	GG63 1	GU63 2	GG68 3	GU68 4
1	16.5000	6.20000	14.6000	6.40000
2	2.50000	2.40000	3.00000	2.50000
3	4.90000	2.60000	3.30000	2.20000
4	15.2000	7.40000	15.8000	7.10000
5	11.9000	3.60000	10.5000	3.20000
6	3.30000	.400000	3.10000	1.70000
7	2.50000	2.60000	3.30000	1.20000
8	2.30000	3.60000	2.60000	4.10000
9	2.70000	4.20000	2.40000	4.50000
10	2.10000	.500000	2.00000	.500000
11	1.80000	2.30000	2.20000	2.90000
12	4.20000	8.30000	5.30000	7.90000
13	3.00000	.800000	2.80000	1.10000
14	6.80000	3.90000	7.40000	3.60000
15	1.70000	8.20000	4.10000	6.80000
16	6.10000	6.20000	5.60000	6.10000
17	2.70000	13.8000	2.70000	16.0000
18	3.70000	8.80000	4.60000	9.00000
19	5.30000	13.2000	3.70000	12.1000
20	.800000	1.00000	1.00000	1.10000

ENTRY	GG74 5	GU74 6	GG78 7	GU78 8
1	12.0000	7.70000	13.9000	8.10000
2	3.10000	2.30000	3.80000	2.60000
3	1.60000	1.60000	1.70000	1.70000
4	16.5000	5.90000	17.6000	5.00000
5	8.60000	3.20000	9.10000	3.00000
6	3.10000	2.10000	3.20000	1.90000
7	2.40000	1.30000	2.40000	1.40000
8	2.40000	4.30000	1.80000	3.90000
9	2.20000	4.00000	2.40000	4.50000
10	1.50000	.500000	1.00000	.400000
11	3.10000	3.10000	3.30000	3.20000
12	6.40000	8.10000	6.10000	9.00000
13	2.80000	1.10000	2.10000	1.50000
14	6.90000	3.80000	7.80000	4.10000
15	6.70000	7.80000	5.20000	5.70000
16	5.80000	6.30000	5.20000	6.30000
17	2.70000	13.8000	2.40000	15.1000
18	4.60000	9.30000	3.60000	9.30000
19	6.40000	12.6000	5.90000	12.2000
20	1.20000	1.20000	1.50000	1.10000

ENTRY	GG84 9	GU84 10	XG63 11	XU63 12
1	13.0000	9.80000	23.0000	3.00000
2	4.20000	2.40000	2.00000	2.00000
3	1.40000	1.60000	49.0000	.500000
4	15.8000	3.00000	15.0000	9.00000
5	8.90000	3.00000	.400000	2.00000
6	2.60000	1.60000	.200000	.100000
7	1.10000	1.30000	.100000	.200000
8	2.30000	4.10000	.200000	1.00000
9	3.70000	5.80000	.300000	2.00000
10	.800000	.400000	3.00000	.900000
11	3.20000	3.70000	.200000	1.60000
12	6.60000	10.0000	[illegible]	[illegible]

15	6.70000	3.50000	.300000	7.00000
16	6.30000	5.40000	.500000	5.00000
17	1.40000	16.0000	.400000	19.0000
18	3.30000	10.6000	.300000	8.00000
19	6.50000	10.4000	1.20000	21.0000
20	1.30000	1.20000	1.10000	1.70000

ENTRY	XG68 13	XU68 14	XG74 15	XU74 16
1	25.0000	3.00000	18.0000	3.00000
2	4.00000	3.00000	2.00000	3.00000
3	26.0000	.500000	10.0000	.400000
4	13.0000	8.00000	13.0000	6.00000
5	2.00000	3.00000	7.00000	1.00000
6	.100000	.100000	.600000	.100000
7	.100000	.200000	.100000	.500000
8	.400000	1.00000	.400000	1.00000
9	.200000	2.00000	.100000	1.00000
10	3.00000	1.00000	3.00000	1.00000
11	.200000	1.60000	.600000	2.00000
12	8.00000	12.0000	6.00000	14.0000
13	2.00000	3.00000	10.0000	5.00000
14	1.00000	2.00000	5.00000	2.00000
15	11.0000	8.00000	17.0000	7.00000
16	1.00000	4.00000	3.00000	10.0000
17	.100000	19.0000	.700000	17.0000
18	.600000	7.00000	2.00000	9.00000
19	.300000	20.0000	.700000	16.0000
20	2.00000	1.60000	.800000	1.00000

ENTRY	XG78 17	XU78 18	XG84 19	XU84 20
1	21.0000	4.00000	20.0000	4.00000
2	2.00000	3.00000	1.00000	2.00000
3	7.00000	.600000	5.00000	.700000
4	12.0000	5.00000	12.0000	4.00000
5	11.0000	2.00000	17.0000	2.00000
6	.600000	.100000	.400000	.100000
7	.200000	.700000	.100000	.500000
8	.300000	1.00000	.600000	1.00000
9	.100000	1.00000	.200000	1.00000
10	3.00000	.600000	2.00000	.700000
11	.700000	2.00000	.700000	3.00000
12	6.00000	14.0000	6.00000	16.0000
13	11.0000	3.00000	10.0000	6.00000
14	7.00000	2.00000	6.00000	2.00000
15	11.0000	6.00000	11.0000	8.00000
16	3.00000	6.00000	3.00000	2.00000
17	.600000	19.0000	1.00000	21.0000
18	2.00000	11.0000	2.00000	11.0000
19	.600000	18.0000	1.00000	14.0000
20	.900000	1.00000	1.00000	1.00000

```
cmoment(print,corr) 63,1 63,20
# GG63 XG63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    1      GG63
VAR   11      XG63

CORRELATION MATRIX
    VARIABLE              GG63          XG63
          SERIES LAG     1    0        11    0
    GG63        1    0   1.0000        .39109
    XG63       11    0   .39109        1.0000
```

```
# GG68 XG68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    3      GG68
VAR   13      XG68

CORRELATION MATRIX
    VARIABLE              GG68           XG68
          SERIES LAG     3    0          13    0
    GG68         3    0    1.0000         .50396
    XG68        13    0    .50396         1.0000



cmoment(print,corr) 63,1 63,20
# GG74 XG74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    5      GG74
VAR   15      XG74

CORRELATION MATRIX
    VARIABLE              GG74           XG74
          SERIES LAG     5    0          15    0
    GG74         5    0    1.0000         .64393
    XG74        15    0    .64393         1.0000



cmoment(print,corr) 63,1 63,20
# GG78 XG78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    7      GG78
VAR   17      XG78

CORRELATION MATRIX
    VARIABLE              GG78           XG78
          SERIES LAG     7    0          17    0
    GG78         7    0    1.0000         .71546
    XG78        17    0    .71546         1.0000



cmoment(print,corr) 63,1 63,20
# GG84 XG84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    9      GG84
VAR   19      XG84

CORRELATION MATRIX
    VARIABLE              GG84           XG84
          SERIES LAG     9    0          19    0
    GG84         9    0    1.0000         .74393
    XG84        19    0    .74393         1.0000



cmoment(print,corr) 63,1 63,20
# GU63 XU63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    2      GU63
VAR   12      XU63
```

```
    VARIABLE              GU63          XU63
          SERIES LAG      2    0        12    0
    GU63           2    0  1.0000        .92004
    XU63          12    0  .92004        1.0000


cmoment(print,corr) 63,1 63,20
# GU68 XU68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    4      GU68
VAR   14      XU68

CORRELATION MATRIX
    VARIABLE              GU68          XU68
          SERIES LAG      4    0        14    0
    GU68           4    0  1.0000        .91251
    XU68          14    0  .91251        1.0000


cmoment(print,corr) 63,1 63,20
# GU74 XU74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    6      GU74
VAR   16      XU74

CORRELATION MATRIX
    VARIABLE              GU74          XU74
          SERIES LAG      6    0        16    0
    GU74           6    0  1.0000        .87951
    XU74          16    0  .87951        1.0000


cmoment(print,corr) 63,1 63,20
# GU78 XU78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR    8      GU78
VAR   18      XU78

CORRELATION MATRIX
    VARIABLE              GU78          XU78
          SERIES LAG      8    0        18    0
    GU78           8    0  1.0000        .93074
    XU78          18    0  .93074        1.0000


cmoment(print,corr) 63,1 63,20
# GU84 XU84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1982:  1
VAR   10      GU84
VAR   20      XU84

CORRELATION MATRIX
    VARIABLE              GU84          XU84
          SERIES LAG     10    0        20    0
    GU84          10    0  1.0000        .87510
    XU84          20    0  .87510        1.0000
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NORMAL COMPLETION OF JOB
          HALT AT      0
              0 ERRORS            0 WARNINGS
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BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -     60
OPE -     10
DAT -    200
MAT -     30
GLO -    500
LOC -      0
CON -    200
COM -    300
SER -    100
open data b:imG
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 I63 I64 I65 I66 I67 I68 I69 I70 I71 I72 I73 I74 I75 I76 $
I77 I78 I79 I80 I81 I82 I83 I84 E63 E64 E65 E66 E67 E68 E69 E70 E71 E72 E73 $
E74 E75 E76 E77 E78 E79 E80 E81 E82 E83 E84 063 065 066 067 068 069 070 $
072 073 074 075 078 080 081 084


set X63 1963,1 1963,21 = ((E63(t)/1000)/((063(t)/55.666)*100))*100
set X65 1963,1 1963,21 = ((E65(t)/1000)/((065(t)/58.345)*100))*100
set X66 1963,1 1963,21 = ((E66(t)/1000)/((066(t)/60.351)*100))*100
set X67 1963,1 1963,21 = ((E67(t)/1000)/((067(t)/61.326)*100))*100
set X68 1963,1 1963,21 = ((E68(t)/1000)/((068(t)/61.199)*100))*100
set X69 1963,1 1963,21 = ((E69(t)/1000)/((069(t)/62.770)*100))*100
set X70 1963,1 1963,21 = ((E70(t)/1000)/((070(t)/65.551)*100))*100
set X72 1963,1 1963,21 = ((E72(t)/1000)/((072(t)/68.941)*100))*100
set X73 1963,1 1963,21 = ((E73(t)/1000)/((073(t)/81.575)*100))*100
set X74 1963,1 1963,21 = ((E74(t)/1000)/((074(t)/100.00)*100))*100
set X75 1963,1 1963,21 = ((E75(t)/1000)/((075(t)/109.102)*100))*100
set X78 1963,1 1963,21 = ((E78(t)/1000)/((078(t)/148.645)*100))*100
set X80 1963,1 1963,21 = ((E80(t)/1000)/((080(t)/218.410)*100))*100
set X81 1963,1 1963,21 = ((E81(t)/1000)/((081(t)/268.541)*100))*100
set X84 1963,1 1963,21 = ((E84(t)/1000)/((084(t)/464.806)*100))*100
set T63 1963,1 1963,21 = (E63(t)-I63(t))/(E63(t)+I63(t))
set T64 1963,1 1963,21 = (E64(t)-I64(t))/(E64(t)+I64(t))
set T65 1963,1 1963,21 = (E65(t)-I65(t))/(E65(t)+I65(t))
set T66 1963,1 1963,21 = (E66(t)-I66(t))/(E66(t)+I66(t))
set T67 1963,1 1963,21 = (E67(t)-I67(t))/(E67(t)+I67(t))
set T68 1963,1 1963,21 = (E68(t)-I68(t))/(E68(t)+I68(t))
set T69 1963,1 1963,21 = (E69(t)-I69(t))/(E69(t)+I69(t))
set T70 1963,1 1963,21 = (E70(t)-I70(t))/(E70(t)+I70(t))
set T71 1963,1 1963,21 = (E71(t)-I71(t))/(E71(t)+I71(t))
set T72 1963,1 1963,21 = (E72(t)-I72(t))/(E72(t)+I72(t))
set T73 1963,1 1963,21 = (E73(t)-I73(t))/(E73(t)+I73(t))
set T74 1963,1 1963,21 = (E74(t)-I74(t))/(E74(t)+I74(t))
set T75 1963,1 1963,21 = (E75(t)-I75(t))/(E75(t)+I75(t))
set T76 1963,1 1963,21 = (E76(t)-I76(t))/(E76(t)+I76(t))
set T77 1963,1 1963,21 = (E77(t)-I77(t))/(E77(t)+I77(t))
set T78 1963,1 1963,21 = (E78(t)-I78(t))/(E78(t)+I78(t))
set T79 1963,1 1963,21 = (E79(t)-I79(t))/(E79(t)+I79(t))
set T80 1963,1 1963,21 = (E80(t)-I80(t))/(E80(t)+I80(t))
set T81 1963,1 1963,21 = (E81(t)-I81(t))/(E81(t)+I81(t))
set T82 1963,1 1963,21 = (E82(t)-I82(t))/(E82(t)+I82(t))
set T83 1963,1 1963,21 = (E83(t)-I83(t))/(E83(t)+I83(t))
set T84 1963,1 1963,21 = (E84(t)-I84(t))/(E84(t)+I84(t))
set M63 1963,1 1963,21 = I63(t)/(I63(t)+(((063(t)*1000)/55.666)*100)-E63(t))
set M65 1963,1 1963,21 = I65(t)/(I65(t)+(((065(t)*1000)/58.345)*100)-E65(t))
set M66 1963,1 1963,21 = I66(t)/(I66(t)+(((066(t)*1000)/60.351)*100)-E66(t))
set M67 1963,1 1963,21 = I67(t)/(I67(t)+(((067(t)*1000)/61.326)*100)-E67(t))
set M68 1963,1 1963,21 = I68(t)/(I68(t)+(((068(t)*1000)/61.199)*100)-E68(t))
set M69 1963,1 1963,21 = I69(t)/(I69(t)+(((069(t)*1000)/62.770)*100)-E69(t))
set M70 1963,1 1963,21 = I70(t)/(I70(t)+(((070(t)*1000)/65.551)*100)-E70(t))
set M72 1963,1 1963,21 = I72(t)/(I72(t)+(((072(t)*1000)/68.941)*100)-E72(t))
set M73 1963,1 1963,21 = I73(t)/(I73(t)+(((073(t)*1000)/81.575)*100)-E73(t))
set M74 1963,1 1963,21 = I74(t)/(I74(t)+(((074(t)*1000)/100.00)*100)-E74(t))
set M75 1963,1 1963,21 = I75(t)/(I75(t)+(((075(t)*1000)/109.102)*100)-E75(t))
set M78 1963,1 1963,21 = I78(t)/(I78(t)+(((078(t)*1000)/148.645)*100)-E78(t))
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set M84 1963,1 1963,21 = I84(t)/(I84(t)+(((O84(t)*1000)/464.806)*100)-E84(t))
print 1963,1 1963,21 X63 X65 X66 X67 X68 X69 X70 X72 X73 X74 X75 $
X78 X80 X81 X84 T63 T64 T65 T66 T67 T68 T69 T70 T71 T72 T73 $
T74 T75 T76 T77 T78 T79 T80 T81 T82 T83 T84 M63 M65 M66 M67 M68 M69 M70 $
M72 M73 M74 M75 M78 M80 M81 M84
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ENTRY	X63 60	X65 61	X66 62	X67 63
1	13.9938	14.9580	14.8105	16.1802
2	9.92165	10.8787	10.1190	10.0449
3	97.4110	71.2669	69.8090	93.7470
4	15.8874	9.62364	12.4083	16.1903
5	1.09562	.897742	2.64048	4.53845
6	.710285	.195118	.223083	.429715
7	.166459	.317865	.428013	.796178
8	1.07066	2.26857	1.89811	2.53313
9	2.09327	1.95096	2.02208	1.65177
10	21.8298	19.5337	20.8768	19.3874
11	1.63059	3.50775	5.80144	2.03324
12	5.12532	3.79063	3.50600	10.2610
13	1.14639	.295741	5.27084	6.01680
14	1.39244	1.65193	2.07386	2.78190
15	1.95760	8.25775	22.8883	44.0485
16	1.51206	2.43132	3.08231	2.90991
17	2.46947	3.19705	3.93933	1.87314
18	1.31058	2.38494	3.32249	2.35422
19	5.69531	3.60040	2.34373	2.66207
20	21.4991	8.78289	9.57414	27.3871
21	15.0560	11.5853	12.0727	15.4490

ENTRY	X68 64	X69 65	X70 66	X72 67
1	15.1802	13.5619	14.4387	27.3874
2	10.6428	13.2169	12.1551	15.3070
3	69.8727	74.8222	65.3758	71.1328
4	13.4647	12.7466	16.6531	19.8627
5	5.12806	8.17232	8.51737	30.7365
6	.632059	.924233	.832431	3.89767
7	.683011	.424549	.640327	.925478
8	2.19053	3.10186	2.60268	3.58862
9	1.46348	1.54795	2.06801	3.05686
10	27.8143	35.1056	27.8653	59.2924
11	1.40143	2.11624	4.47531	2.65788
12	17.8418	14.8505	20.6032	20.9386
13	6.38718	5.17073	5.04234	7.26823
14	2.46900	3.64858	3.40389	7.33469
15	38.1729	52.5453	48.9863	32.8245
16	2.40315	3.47251	2.20887	7.14710
17	.812428	.632311	1.51540	4.26981
18	2.01859	2.99515	2.77945	5.22855
19	1.29870	1.78663	2.78701	2.31654
20	27.8096	20.0283	14.6015	37.8978
21	13.4506	14.0712	14.6078	19.4517

ENTRY	X73 68	X74 69	X75 70	X78 71
1	19.6185	16.1066	16.1154	16.1285
2	13.9528	7.64926	9.26365	6.77093
3	41.1572	64.1940	48.8127	44.0569
4	20.6723	16.4314	13.8674	15.9614
5	26.8881	26.7514	34.0725	35.6981
6	3.22779	3.93717	3.73283	4.21315
7	.408548	.838203	1.82131	1.96567
8	1.94523	3.49776	3.87682	3.01617
9	2.42849	1.70175	1.45116	1.24869
10	35.6865	41.7120	38.9174	53.8030
11	2.03941	3.32458	4.69248	4.52775
12	18.2205	13.9189	17.2549	16.2362
13	54.5240	25.1042	29.1338	28.6539
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

17	3.22735	4.66462	5.55497	4.93179
18	4.22223	6.33927	10.2277	10.2008
19	2.83528	3.97392	9.48366	3.25675
20	24.7504	16.9928	19.6474	18.3100
21	17.6643	16.9994	17.6724	17.2110

ENTRY	X80 72	X81 73	X84 74	T63 75
1	16.8097	18.4385	23.4307	-.181850
2	6.23665	4.97091	6.46523	.751161
3	33.4732	28.9022	41.4240	.998742
4	15.9621	17.0686	22.5531	-.184699
5	28.1020	59.7202	50.0085	-.694530
6	3.47424	3.89584	5.05821	-.972506
7	.928957	3.64511	1.26918	-.765524
8	10.2430	9.03463	6.03520	-.967478
9	1.38246	3.96780	2.00268	-.212395
10	27.7331	47.7552	28.4242	.789792
11	3.72505	4.62154	4.31413	-.914127
12	24.3867	15.7047	19.0660	-.918080
13	28.9243	9.68097	21.4934	-.955925
14	17.4642	20.7427	21.9313	-.807498
15	27.4658	21.5781	30.2832	-.975815
16	10.5910	17.2491	9.16961	-.905533
17	6.20935	12.7406	14.1368	-.982171
18	9.06093	11.9696	8.96903	-.974753
19	2.96622	5.26353	2.71817	-.903523
20	19.4073	41.6412	30.3063	-.736549
21	17.3443	16.4840	20.5557	-.453673

ENTRY	T64 76	T65 77	T66 78	T67 79
1	-.256190	-.343436	-.289223	-.214993
2	.776720	.762334	.610015	.556026
3	.997343	.996468	.996718	.997793
4	-.205049	-.460064	-.362220	-.205176
5	-.611380	-.676520	-.442010	-.944790E-01
6	-.980113	-.992588	-.992721	-.982414
7	-.886421	-.772343	-.748282	-.462372
8	-.942192	-.930228	-.937266	-.921855
9	-.443697	-.381270	-.425993	-.532532
10	.763872	.721408	.741893	.762114
11	-.917606	-.923744	-.857117	-.879198
12	-.889750	-.890254	-.903803	-.804853
13	-.962063	-.993877	-.828945	-.771166
14	-.846708	-.795235	-.749813	-.692756
15	-.970876	-.913734	-.699823	-.391589
16	-.910121	-.897467	-.841424	-.846574
17	-.983729	-.979021	-.972399	-.986775
18	-.959224	-.948821	-.915264	-.948067
19	-.899321	-.919384	-.966227	-.971493
20	-.699003	-.694851	-.678282	-.714107
21	-.504318	-.587679	-.569357	-.474093

ENTRY	T68 80	T69 81	T70 82	T71 83
1	-.313854	-.241856	-.258114	-.178948
2	.487633	.642896	.747200	.718837
3	.995649	.995829	.987923	.982706
4	-.371429	-.300712	-.607442E-01	.332178E-01
5	-.944380E-01	.333334	.502506	.661205
6	-.981188	-.961958	-.953307	-.902771
7	-.686900	-.618198	-.600336	-.744871
8	-.942792	-.891219	-.913397	-.899259
9	-.629230	-.535395	-.436980	-.354828
10	.793839	.796799	-.661090E-01	-.199578E-01
11	-.931412	-.846762	-.674262	-.696876
12	-.718021	-.712575	-.604392	-.606518
13	-.788497	-.774046	-.731367	-.795247
14	[illegible]	[illegible]	[illegible]	[illegible]

17	-.995587	-.995337	-.991961	-.985307
18	-.963494	-.922409	-.917906	-.880493
19	-.989399	-.982017	-.958955	-.964028
20	-.720586	-.760493	-.789663	-.768729
21	-.611833	-.501850	-.464123	-.455676

ENTRY	T72 84	T73 85	T74 86	T75 87
1	-.173469E-01	-.125577	.104583	.925323E-01
2	.725748	.555733	.492717	.691070
3	.984615	.969605	.981736	.979846
4	.765723E-01	.110866	.115057	.669178E-02
5	.728285	.721313	.756733	.863239
6	-.845494	-.771004	-.653763	-.604933
7	-.744483	-.747675	-.334664	-.886078E-03
8	-.885378	-.933854	-.872207	-.894700
9	-.323047	-.209591	-.299944	-.439399
10	.400962E-01	-.277193E-02	.127971	.205909
11	-.763063	-.784569	-.570144	-.456653
12	-.568523	-.646662	-.627015	-.557867
13	-.724727	.439271	.351052	.462593
14	-.226201	-.400821	.377415	.444049
15	-.177429	-.201885	-.975510E-01	-.109802
16	-.647651	-.649120	-.323397	-.112483E-03
17	-.984679	-.980960	-.961191	-.951430
18	-.822799	-.848460	-.795181	-.687729
19	-.964827	-.956549	-.926104	-.792944
20	-.723708	-.644725	-.652423	-.663443
21	-.402239	-.379225	-.269802	-.209948

ENTRY	T76 88	T77 89	T78 90	T79 91
1	.376975E-01	.912599E-03	.694238E-01	.148027E-01
2	.645229	.550991	.520195	.454705
3	.971059	.940368	.919734	.850297
4	.172055	.149706E-01	.168296	.139951
5	.865838	.812277	.793809	.765382
6	-.453258	-.545302	-.624648	-.665244
7	-.194245	-.118799	-.155146	-.363545
8	-.881283	-.855514	-.876212	-.560404
9	-.544679	-.513841	-.592244	-.485701
10	.972252E-01	.145138	.119676	.108081
11	-.472894	-.523360	-.509528	-.525525
12	-.605975	-.581683	-.565840	-.654096
13	-.320389E-01	-.704286E-01	.194263	.454842
14	.500405	.402104	.426187	.274419
15	-.167009E-01	-.167559	-.988481E-01	-.105414
16	-.683334E-01	-.155781	-.289462	-.318241
17	-.947017	-.955735	-.948140	-.958382
18	-.599841	-.668036	-.681257	-.669386
19	-.819766	-.828718	-.960303	-.950747
20	-.655550	-.669675	-.700551	-.786839
21	-.224762	-.301265	-.235086	-.256112

ENTRY	T80 92	T81 93	T82 94	T83 95
1	.460864E-01	-.491591E-01	-.102249	-.102879E-01
2	.406662	.416098	.158751	.226327
3	.827516	.736564	.705286	.690168
4	.176906	.228612E-01	.669781E-01	.129771
5	.691801	.729814	.738319	.743057
6	-.600547	-.641887	-.603231	-.552500
7	-.452419	-.557067	-.682840	-.522262
8	-.605465	-.609259	-.652715	-.779985
9	-.524004	-.163820	-.142412	-.191824
10	.162476	-.590035	-.527398	-.504793
11	-.514957	-.505017	-.508281	-.463714
12	-.408453	-.555861	-.493912	-.483573
13	.661668	.550735	.689034	.480797
14	.395162	.492679	.517272	.562867

17	-.948371	-.907212	-.864550	-.903933
18	-.684948	-.552742	-.614732	-.654203
19	-.942413	-.826312	-.856130	-.842942
20	-.751588	-.671897	-.672025	-.679582
21	-.195157	-.200336	-.191979	-.162180

ENTRY	T84 96	M63 97	M65 98	M66 99
1	-.372861E-01	.190308	.264650	.239740
2	.198895	.154103E-01	.161951E-01	.265463E-01
3	.659049	.231276E-01	.436828E-02	.378579E-02
4	.107893	.215356	.223571	.232287
5	.749884	.578928E-01	.448440E-01	.654977E-01
6	-.597336	.339162	.344504	.379697
7	-.563269	.123991E-01	.242237E-01	.289895E-01
8	-.779318	.395671	.391046	.374016
9	-.237416	.318629E-01	.425311E-01	.487705E-01
10	-.473909	.317570E-01	.378024E-01	.376255E-01
11	-.487172	.269799	.478376	.444593
12	-.512951	.558474	.404272	.418290
13	.363736	.339774	.491317	.373011
14	.484576	.117067	.128359	.129009
15	.578346E-01	.619945	.666309	.626979
16	-.165455	.236460	.315608	.269705
17	-.906726	.737875	.757013	.745578
18	-.699837	.509494	.481955	.437185
19	-.908128	.543705	.470684	.582855
20	-.621406	.643523	.348443	.355806
21	-.148600	.320475	.335353	.333495

ENTRY	M67 100	M68 101	M69 102	M70 103
1	.230041	.255231	.204456	.222502
2	.308773E-01	.394051E-01	.320433E-01	.196276E-01
3	.162912E-01	.503071E-02	.617251E-02	.113412E-01
4	.226553	.253445	.213670	.184105
5	.543403E-01	.613205E-01	.426023E-01	.299056E-01
6	.327276	.401154	.324829	.259892
7	.213638E-01	.357282E-01	.177497E-01	.251560E-01
8	.389937	.432003	.357548	.371227
9	.521872E-01	.612649E-01	.493935E-01	.511396E-01
10	.314468E-01	.424054E-01	.576509E-01	.306031
11	.244060	.285839	.206698	.194070
12	.513977	.569545	.509603	.512763
13	.331333	.365868	.299773	.254977
14	.136184	.134893	.120297	.122553
15	.642942	.616823	.580351	.504399
16	.265095	.391659	.264819	.208837
17	.741449	.787405	.731410	.792221
18	.474896	.525633	.433426	.400446
19	.654141	.711743	.667215	.577752
20	.693377	.703454	.647996	.592634
21	.338691	.392218	.330520	.318517

ENTRY	M72 104	M73 105	M74 106	M75 107
1	.280828	.239063	.134674	.137613
2	.279200E-01	.442562E-01	.273776E-01	.183094E-01
3	.187438E-01	.106786E-01	.162541E-01	.961413E-02
4	.175326	.172582	.134982	.137083
5	.652167E-01	.561967E-01	.481392E-01	.365479E-01
6	.326345	.205060	.163713	.136087
7	.599516E-01	.276282E-01	.166737E-01	.182448E-01
8	.379750	.367083	.346836	.420527
9	.580502E-01	.366914E-01	.311458E-01	.364312E-01
10	.573424	.358138	.356185	.295550
11	.168866	.147090	.111596	.116603
12	.490513	.509399	.413606	.423552
13	.329348	.318386	.138674	.131232
14	[illegible]	[illegible]	[illegible]	[illegible]

16	.264672	.195557	.181952	.148051
17	.852461	.776277	.712028	.702658
18	.362046	.349688	.372342	.381093
19	.569848	.567835	.518924	.475686
20	.791977	.603595	.493219	.547208
21	.361631	.322797	.262625	.247411

ENTRY	M78 108	M80 109	M81 110	M84 111
1	.143347	.155590	.199645	.247957
2	.224088E-01	.272907E-01	.211134E-01	.441479E-01
3	.318780E-01	.453355E-01	.580858E-01	.126892
4	.119105	.117262	.164310	.189948
5	.599859E-01	.664708E-01	.188033	.125095
6	.159932	.126041	.156729	.174472
7	.266835E-01	.242674E-01	.117377	.439899E-01
8	.320360	.317116	.290300	.341178
9	.470531E-01	.429549E-01	.543796E-01	.320964E-01
10	.477992	.216599	.779987	.526645
11	.127369	.107818	.128410	.115630
12	.411446	.434360	.394909	.422560
13	.213193	.765188E-01	.301178E-01	.113266
14	.915492E-01	.840240E-01	.816836E-01	.888652E-01
15	.340382	.340786	.253530	.278956
16	.145350	.135775	.196487	.123563
17	.660873	.714158	.750072	.770941
18	.374677	.347632	.320676	.358137
19	.624396	.507655	.368769	.367219
20	.560029	.629351	.784294	.650634
21	.251315	.237573	.228556	.258745

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -     60
OPE -     10
DAT -    200
MAT -     30
GLO -    500
LOC -      0
CON -    200
COM -    300
SER -    100
open data b:imU
cal 1963 1 1
all 0 1963,21
data 1963,1 1963,21 I63 I68 I70 I71 I72 I73 I74 I75 I76 $
I78 I79 I81 I82 I83 I84 E63 E68 E70 E71 E72 E73 $
E74 E75 E76 E78 E79 E81 E82 E83 E84 O63 O68 O70 $
O71 O72 O73 O74 O75 O76 O78 O79 O81 O82 O83 O84


set X63 1963,1 1963,21 = (E63(t)/((O63(t)/49.1)*100))*100
set X68 1963,1 1963,21 = (E68(t)/((O68(t)/58.0)*100))*100
set X70 1963,1 1963,21 = (E70(t)/((O70(t)/64.9)*100))*100
set X71 1963,1 1963,21 = (E71(t)/((O71(t)/72.0)*100))*100
set X72 1963,1 1963,21 = (E72(t)/((O72(t)/79.4)*100))*100
set X73 1963,1 1963,21 = (E73(t)/((O73(t)/85.5)*100))*100
set X74 1963,1 1963,21 = (E74(t)/((O74(t)/100.0)*100))*100
set X75 1963,1 1963,21 = (E75(t)/((O75(t)/127.3)*100))*100
set X76 1963,1 1963,21 = (E76(t)/((O76(t)/145.7)*100))*100
set X78 1963,1 1963,21 = (E78(t)/((O78(t)/183.3)*100))*100
set X79 1963,1 1963,21 = (E79(t)/((O79(t)/206.6)*100))*100
set X81 1963,1 1963,21 = (E81(t)/((O81(t)/272.0)*100))*100
set X82 1963,1 1963,21 = (E82(t)/((O82(t)/290.7)*100))*100
set X83 1963,1 1963,21 = (E83(t)/((O83(t)/306.9)*100))*100
set X84 1963,1 1963,21 = (E84(t)/((O84(t)/322.1)*100))*100
set T63 1963,1 1963,21 = (E63(t)-I63(t))/(E63(t)+I63(t))
set T68 1963,1 1963,21 = (E68(t)-I68(t))/(E68(t)+I68(t))
set T70 1963,1 1963,21 = (E70(t)-I70(t))/(E70(t)+I70(t))
set T71 1963,1 1963,21 = (E71(t)-I71(t))/(E71(t)+I71(t))
set T72 1963,1 1963,21 = (E72(t)-I72(t))/(E72(t)+I72(t))
set T73 1963,1 1963,21 = (E73(t)-I73(t))/(E73(t)+I73(t))
set T74 1963,1 1963,21 = (E74(t)-I74(t))/(E74(t)+I74(t))
set T75 1963,1 1963,21 = (E75(t)-I75(t))/(E75(t)+I75(t))
set T76 1963,1 1963,21 = (E76(t)-I76(t))/(E76(t)+I76(t))
set T78 1963,1 1963,21 = (E78(t)-I78(t))/(E78(t)+I78(t))
set T79 1963,1 1963,21 = (E79(t)-I79(t))/(E79(t)+I79(t))
set T81 1963,1 1963,21 = (E81(t)-I81(t))/(E81(t)+I81(t))
set T82 1963,1 1963,21 = (E82(t)-I82(t))/(E82(t)+I82(t))
set T83 1963,1 1963,21 = (E83(t)-I83(t))/(E83(t)+I83(t))
set T84 1963,1 1963,21 = (E84(t)-I84(t))/(E84(t)+I84(t))
set M63 1963,1 1963,21 = I63(t)/(I63(t)+(((O63(t))/49.1)*100)-E63(t))
set M68 1963,1 1963,21 = I68(t)/(I68(t)+(((O68(t))/58.0)*100)-E68(t))
set M70 1963,1 1963,21 = I70(t)/(I70(t)+(((O70(t))/64.9)*100)-E70(t))
set M71 1963,1 1963,21 = I71(t)/(I71(t)+(((O71(t))/72.0)*100)-E71(t))
set M72 1963,1 1963,21 = I72(t)/(I72(t)+(((O72(t))/79.4)*100)-E72(t))
set M73 1963,1 1963,21 = I73(t)/(I73(t)+(((O73(t))/85.5)*100)-E73(t))
set M74 1963,1 1963,21 = I74(t)/(I74(t)+(((O74(t))/100.0)*100)-E74(t))
set M75 1963,1 1963,21 = I75(t)/(I75(t)+(((O75(t))/127.3)*100)-E75(t))
set M76 1963,1 1963,21 = I76(t)/(I76(t)+(((O76(t))/145.7)*100)-E76(t))
set M78 1963,1 1963,21 = I78(t)/(I78(t)+(((O78(t))/183.3)*100)-E78(t))
set M79 1963,1 1963,21 = I79(t)/(I79(t)+(((O79(t))/206.6)*100)-E79(t))
set M81 1963,1 1963,21 = I81(t)/(I81(t)+(((O81(t))/272.0)*100)-E81(t))
set M82 1963,1 1963,21 = I82(t)/(I82(t)+(((O82(t))/290.7)*100)-E82(t))
set M83 1963,1 1963,21 = I83(t)/(I83(t)+(((O83(t))/306.9)*100)-E83(t))
set M84 1963,1 1963,21 = I84(t)/(I84(t)+(((O84(t))/322.1)*100)-E84(t))
print 1963,1 1963,21 X63 X68 X70 X71 X72 X73 X74 X75 X76 $
X78 X79 X81 X82 X83 X84 T63 T68 T70 T71 T72 T73 $
T74 T75 T76 T78 T79 T81 T82 T83 T84 M63 M68 M70 $
M71 M72 M73 M74 M75 M76 M78 M79 M81 M82 M83 M84
```

ENTRY	X63 46	X68 47	X70 48	X71 49
1	4.39751	4.05318	3.90648	4.50000
2	8.04848	17.7080	16.2931	18.6735
3	1.52435	7.39500	8.01706	8.89412
4	17.3254	19.0917	19.6414	20.8853
5	7.03823	13.7543	9.70862	9.13043
6	2.82184	.621429	.853947	.827586
7	1.49291	3.25366	5.36130	5.86667
8	5.62733	5.58909	6.29912	7.04895
9	7.66678	9.61951	5.47456	5.89880
10	20.0351	29.2900	28.0250	29.7391
11	11.6385	10.0488	11.8790	12.8529
12	17.6557	19.8339	20.3767	22.4403
13	18.0524	15.6305	15.0906	15.0632
14	8.46337	8.77565	9.75904	10.4260
15	11.0390	12.2804	14.0301	16.7820
16	11.3823	11.0681	20.6774	24.7390
17	27.6412	30.0937	33.3088	37.2424
18	16.9642	15.4152	18.6492	20.7148
19	24.7239	26.9966	28.6347	32.5333
20	26.9648	8.61714	8.54517	9.37143
21	14.2162	15.5138	16.9925	19.0841

ENTRY	X72 50	X73 51	X74 52	X75 53
1	5.17438	5.83625	5.62971	6.82006
2	20.1830	18.4644	11.2155	10.8953
3	9.78321	10.2048	10.7813	13.1846
4	22.1726	23.9352	23.1818	23.0324
5	9.62589	9.61243	9.80392	10.8233
6	.714600	.557609	.636943	.661299
7	5.98554	6.07771	7.87879	8.97920
8	7.28671	7.36005	7.90614	8.47140
9	6.59497	6.18169	5.46512	6.23770
10	29.1133	30.9309	31.1111	30.8703
11	12.8640	12.7433	12.2857	15.2207
12	24.1748	24.5997	25.3364	25.9609
13	15.4903	16.5727	12.8295	13.6487
14	10.1829	10.7933	11.0924	11.7273
15	15.8431	15.6776	13.9973	15.8166
16	28.5066	37.2087	29.7495	33.3553
17	42.4523	38.3428	35.9467	42.9568
18	23.4086	23.4894	24.6986	31.1825
19	34.2926	33.9531	30.8216	36.1084
20	9.67128	10.2711	10.0498	9.01239
21	20.1931	20.4115	18.7447	21.4222

ENTRY	X76 54	X78 55	X79 56	X81 57
1	6.71705	7.02667	5.74059	6.02727
2	10.1705	12.2886	11.8541	20.9624
3	13.2587	14.4780	3.80066	27.2000
4	24.7774	27.3930	27.8741	33.7689
5	14.0496	17.6250	17.0292	20.2016
6	.672462	1.05438	.957220	1.07626
7	12.3554	14.3269	13.2888	11.4216
8	9.20211	10.3511	9.86809	10.5600
9	6.22718	7.49526	7.15696	7.35738
10	32.6476	32.0130	37.8767	41.6500
11	15.3059	15.4106	14.6021	15.9762
12	26.4423	31.1401	30.2714	35.1005
13	16.8428	15.3186	15.0182	17.9007
14	11.4242	12.9250	12.0937	12.0744
15	14.7917	18.0475	19.9332	34.1805
16	37.1417	19.4793	22.3177	13.8074
17	42.1641	44.1674	41.8063	48.8713
18	32.4245	36.1707	35.3126	36.2530
19	37.6847	41.5329	39.2442	40.4089
20	8.93833	9.41641	8.67266	12.9284
21	[illegible]	[illegible]	[illegible]	[illegible]

ENTRY	X82 58	X83 59	X84 60	T63 61
1	5.89860	7.63184	6.95829	-.781609
2	23.3311	22.0716	22.8605	.196203
3	25.7021	27.5659	25.7299	.767442
4	33.2229	30.7895	31.2777	.796586E-01
5	19.0562	20.8632	20.3650	-.202532
6	1.04500	1.02585	1.37064	-.666667
7	11.4844	11.5525	11.4797	-.933086
8	10.8470	11.0972	11.9805	-.721286
9	7.38634	7.67250	7.86332	.453608
10	42.0397	42.7931	49.9255	-.206897E-01
11	15.7898	21.7015	20.7423	.286432
12	36.8545	33.4339	34.5709	.116448
13	18.3879	20.2166	18.7050	-.204513
14	10.8432	12.2840	12.7893	.339901
15	34.3435	36.8853	35.6788	-.140969
16	13.0959	11.2597	12.0860	.478261
17	49.6453	54.3102	57.0408	.398182
18	39.3652	33.7858	33.4627	.513326
19	40.7979	34.2323	35.9571	.818763
20	12.0036	11.5195	10.8900	.276190
21	25.6643	25.2190	25.5774	.292480E-01

ENTRY	T68 62	T70 63	T71 64	T72 65
1	-.765495	-.787075	-.769205	-.746567
2	.314286	.349624	.303079	.184962
3	.672131	.680000	.555556	.516484
4	-.628931E-02	.686209E-01	-.137500E-01	-.601030E-01
5	-.105925	-.196507	-.329502	-.383275
6	-.675676	-.500000	-.555556	-.571429
7	-.930618	-.885196	-.869048	-.867028
8	-.735000	-.719149	-.688889	-.707661
9	.441696	.186603	.172414	.187500
10	.860215E-01	.124260	.734463E-01	.426540E-01
11	.216327	.314103	.274336	.142077
12	.122070	.796460E-01	.100606	.751315E-01
13	-.304918	-.231183	-.205000	-.185659
14	.303371	.230303	.289017	.204244
15	-.244644	-.200000	-.128397	-.177767
16	-.431730	.524109E-02	.363218E-01	.149858E-01
17	.179987	.231650	.280272	.216249
18	.647372E-01	.421333E-01	.530000E-01	-.445004E-01
19	.360876	.500000	.401493	.267713
20	.204633	.157509	.933333E-01	-.121951E-01
21	-.102452	-.448163E-01	-.269088E-01	-.765618E-01

ENTRY	T73 66	T74 67	T75 68	T76 69
1	-.700815	-.627360	-.577134	-.581775
2	.477419E-01	.217391	.271829	.297030
3	.510204	.550562	.689320	.639640
4	-.255654E-01	.135983E-01	-.262829E-01	-.338059E-01
5	-.429429	-.357945	-.387302	-.321229
6	-.600000	-.591837	-.515152	-.454545
7	-.887619	-.825698	-.743506	-.716578
8	-.670936	-.649319	-.618950	-.605119
9	.212598	.215517	.240506	.248000
10	.819672E-02	.148718	.659341E-01	.614035E-01
11	.116945	.119306	.206140	.223529
12	.106822	.138983	.183259	.182930
13	-.114688	-.616967E-01	-.538287E-01	.349127E-01
14	.217184	.191874	.299517	.308057
15	-.190204	-.238590	-.165977	-.186057
16	.706945E-01	.707351E-01	.287278E-01	.128372
17	.147757	.208969	.266544	.262597
18	-.119114	.396396E-02	.107308	.976083E-01
19	.239858	.333518	.350299	.274284
20	-.680101E-01	.385604E-01	.958904E-01	.745342E-01
21	[illegible]	[illegible]	[illegible]	[illegible]

ENTRY	T78 70	T79 71	T81 72	T82 73
1	-.520000	-.572734	-.556042	-.572584
2	.295393	.174194	.188406	.200000
3	.639098	.647887	.722892	.657143
4	-.878214E-01	-.138928	-.212259	-.249428
5	-.267193	-.353398	-.411765	-.456290
6	-.500000	-.571429	-.511111	-.511111
7	-.652618	-.708096	-.717201	-.722142
8	-.560842	-.591304	-.648625	-.644760
9	.290735	.222892	.175074	.150997
10	-.387597E-01	-.161905	-.212851	-.182609
11	.679934E-01	-.308642E-02	.210016E-01	-.721966E-01
12	.150579	.105606	.107890	.902338E-01
13	-.930233E-01	-.637771E-01	-.648794E-01	-.777096E-01
14	.222222	.110320	.116935	.239044E-01
15	-.125000	-.164509	-.154510	-.150827
16	.402116E-01	-.452694E-03	.865801E-02	-.298507E-01
17	.201193	.127814	.149404	.126786
18	.308394E-01	-.507246E-01	-.135320	-.166279
19	.375276E-01	-.300287E-01	.414606E-01	-.548642E-01
20	.487805E-02	-.883055E-01	-.254237	-.268657
21	-.178758E-01	-.762778E-01	-.786793E-01	-.108630

ENTRY	T83 74	T84 75	M63 76	M68 77
1	-.532384	-.551216	.272857	.241297
2	.133603	.102999	.555490E-01	.100938
3	.694915	.607143	.203263E-02	.154165E-01
4	-.294185	-.295908	.151563	.192867
5	-.463035	-.487358	.102469	.164764
6	-.478261	-.461538	.126782	.312968E-01
7	-.775000	-.768279	.304503	.483421
8	-.636838	-.630023	.269143	.279326
9	.127371	.130024	.302666E-01	.395853E-01
10	-.188525	-.150685	.207063	.258494
11	-.142296	-.157699	.680862E-01	.671442E-01
12	.517911E-01	.457441E-01	.145070	.162184
13	-.266198E-01	-.258028	.250129	.258052
14	.474576E-01	.253165E-01	.435652E-01	.489021E-01
15	-.160794	-.108635	.141494	.187441
16	-.122610	-.150407	.433667E-01	.238711
17	-.339032E-01	-.399488E-01	.141207	.230272
18	-.170148	-.172853	.616507E-01	.137994
19	-.172364	-.149291	.316916E-01	.147974
20	-.273713	-.275510	.173142	.586111E-01
21	-.162465	-.171928	.135175	.184037

ENTRY	M70 78	M71 79	M72 80	M73 81
1	.254398	.265360	.273286	.260544
2	.857544E-01	.109371	.148157	.170689
3	.163304E-01	.271357E-01	.334199E-01	.355479E-01
4	.175619	.213434	.243187	.248786
5	.138020	.166135	.192832	.210377
6	.251882E-01	.283784E-01	.257120E-01	.219374E-01
7	.481934	.470765	.471996	.520822
8	.291536	.291622	.314645	.287457
9	.381847E-01	.423737E-01	.460832E-01	.410302E-01
10	.232717	.267585	.273836	.305817
11	.657356E-01	.774776E-01	.998293E-01	.103511
12	.179087	.191223	.215233	.208410
13	.221553	.211858	.210656	.200074
14	.633694E-01	.603270E-01	.696955E-01	.721967E-01
15	.196656	.207027	.212387	.214617
16	.205060	.234109	.278997	.339640
17	.237557	.250155	.322203	.315892
18	.174037	.190263	.250430	.280594
19	.117969	.170764	.231639	.239644
20	.636767E-01	.789779E-01	.988647E-01	.115963
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ENTRY	M74 82	M75 83	M76 84	M78 85
1	.206678	.214442	.214046	.193111
2	.751079E-01	.654270E-01	.578160E-01	.708100E-01
3	.338409E-01	.271712E-01	.325023E-01	.359355E-01
4	.227010	.239777	.260594	.310309
5	.186920	.215569	.241378	.270066
6	.243902E-01	.203792E-01	.177336E-01	.309782E-01
7	.472527	.401402	.460569	.443071
8	.287629	.282245	.291763	.290967
9	.359684E-01	.391366E-01	.384750E-01	.426261E-01
10	.250755	.281254	.300035	.337240
11	.992665E-01	.105678	.102887	.137175
12	.204155	.194864	.198909	.250294
13	.142758	.149692	.158869	.178985
14	.779956E-01	.668266E-01	.638692E-01	.863064E-01
15	.209331	.208023	.201889	.220661
16	.268753	.320902	.313392	.182481
17	.268575	.303668	.298629	.344722
18	.245514	.267558	.282890	.347587
19	.182122	.213789	.256177	.397218
20	.937343E-01	.755437E-01	.779499E-01	.933352E-01
21	.196884	.204877	.210186	.236665

ENTRY	M79 86	M81 87	M82 88	M83 89
1	.183124	.183541	.187408	.213070
2	.864086E-01	.153351	.168657	.177948
3	.837125E-02	.566872E-01	.667920E-01	.641100E-01
4	.338262	.439660	.453010	.449251
5	.300500	.377947	.386717	.418032
6	.342245E-01	.325341E-01	.316093E-01	.285292E-01
7	.472790	.439138	.445722	.507487
8	.298882	.356485	.360336	.360044
9	.466985E-01	.528080E-01	.555602E-01	.604359E-01
10	.458073	.523771	.512052	.522813
11	.146793	.154203	.178095	.269609
12	.259916	.303381	.327520	.311675
13	.167222	.198905	.208407	.210892
14	.992905E-01	.979376E-01	.103895	.112966
15	.257607	.414900	.414826	.447015
16	.223334	.136026	.137907	.139671
17	.357148	.414300	.433120	.559879
18	.376651	.427492	.475941	.418431
19	.406855	.384279	.434752	.424396
20	.101816	.199818	.191351	.185882
21	.243649	.284370	.300405	.318834

ENTRY	M84 90
1	.205403
2	.194201
3	.780729E-01
4	.455838
5	.425935
6	.363490E-01
7	.497394
8	.374873
9	.616533E-01
10	.574614
11	.264546
12	.325303
13	.280637
14	.122350
15	.408250
16	.156937
17	.589876
18	.416266
19	.431337
20	.177061
21	[illegible]

```
end

          NORMAL COMPLETION OF JOB
                   HALT AT      0
                      0 ERRORS           0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:cor
cal 1963 1 1
all 0 1963.21
data 1963.1 1963.21 EG63 EU63 EG68 EU68 EG74 EU74 EG78 EU78 EG84 EU84 TG63 $
TU63 TG68 TU68 TG74 TU74 TG78 TU78 TG84 TU84 IG63 IU63 IG68 IU68 IG74 IU74 $
IG78 IU78 IG84 IU84
print 1963.1 1963.21 EG63 EU63 EG68 EU68 EG74 EU74 EG78 EU78 EG84 EU84 TG63 $
TU63 TG68 TU68 TG74 TU74 TG78 TU78 TG84 TU84 IG63 IU63 IG68 IU68 IG74 IU74 $
IG78 IU78 IG84 IU84
```

ENTRY	EG63 1	EU63 2	EG68 3	EU68 4
1	14.0000	4.40000	15.2000	4.00000
2	9.90000	8.00000	10.6000	17.7000
3	97.4000	1.50000	69.9000	7.40000
4	15.9000	17.3000	13.5000	19.1000
5	1.10000	7.00000	5.10000	13.7000
6	.700000	2.80000	.600000	.600000
7	.200000	1.50000	.700000	3.20000
8	1.10000	5.60000	2.20000	5.60000
9	2.10000	7.70000	1.50000	9.60000
10	21.8000	20.0000	27.8000	29.3000
11	1.60000	11.6000	1.40000	10.1000
12	5.10000	17.7000	17.8000	19.8000
13	1.10000	18.0000	6.40000	15.6000
14	1.40000	8.50000	2.50000	8.80000
15	2.00000	11.0000	38.2000	12.3000
16	1.50000	11.4000	2.40000	11.1000
17	2.50000	27.6000	.800000	30.1000
18	1.30000	17.0000	2.00000	15.4000
19	5.70000	24.7000	1.30000	27.0000
20	21.5000	27.0000	27.8000	8.60000
21	15.1000	14.2000	13.5000	15.5000

ENTRY	EG74 5	EU74 6	EG78 7	EU78 8
1	16.1000	5.60000	16.1000	7.00000
2	7.60000	11.2000	6.80000	12.3000
3	64.2000	10.8000	44.1000	14.5000
4	16.4000	23.2000	16.0000	27.4000
5	26.7000	9.80000	35.7000	17.6000
6	3.90000	.600000	4.20000	1.00000
7	.800000	7.90000	2.00000	14.3000
8	3.50000	7.90000	3.00000	10.3000
9	1.70000	5.50000	1.20000	7.50000
10	41.7000	31.1000	53.8000	32.0000
11	3.30000	12.3000	4.50000	15.4000
12	13.9000	25.3000	16.2000	31.1000
13	25.1000	12.8000	28.7000	15.3000
14	14.4000	11.1000	20.0000	12.9000
15	38.6000	14.0000	29.7000	18.0000
16	10.2000	29.7000	8.60000	19.5000
17	4.70000	35.9000	4.90000	44.2000
18	6.30000	24.7000	10.2000	36.2000
19	4.00000	30.8000	3.30000	41.5000
20	17.0000	10.1000	18.3000	9.40000
21	17.0000	18.7000	17.2000	23.0000

ENTRY	EG84 9	EU84 10	TG63 11	TU63 12
1	23.4000	7.00000	-.180000	-.780000
2	6.50000	22.9000	.750000	.200000
3	41.4000	25.7000	.990000	.770000
4	22.6000	31.3000	-.190000	.800000E-01
5	50.0000	20.4000	-.690000	-.200000
6	5.10000	1.40000	-.970000	-.670000
7	1.30000	11.5000	-.770000	-.930000
8	6.00000	12.0000	-.970000	-.720000
9	2.00000	7.90000	-.210000	.450000
10	28.4000	49.9000	.790000	-.200000E-01
11	4.30000	20.7000	-.910000	.290000
12	19.1000	34.6000	-.920000	.120000
13	21.5000	18.7000	-.960000	-.200000
14	21.9000	12.8000	-.810000	.340000
15	30.3000	35.7000	-.980000	-.140000
16	9.20000	12.1000	-.910000	.480000
17	14.1000	57.0000	-.980000	.400000
18	9.00000	33.5000	-.970000	.510000
19	2.70000	36.0000	-.900000	.820000
20	30.3000	10.9000	-.740000	.280000
21	20.6000	25.6000	-.450000	.300000E-01

ENTRY	TG68 13	TU68 14	TG74 15	TU74 16
1	-.310000	-.770000	.110000	-.630000
2	.490000	.310000	.490000	.220000
3	.990000	.670000	.980000	.550000
4	-.370000	-.100000E-01	.120000	.100000E-01
5	-.900000E-01	-.110000	.760000	-.360000
6	-.980000	-.680000	-.650000	-.590000
7	-.690000	-.930000	-.330000	-.830000
8	-.940000	-.730000	-.870000	-.650000
9	-.630000	.440000	-.300000	.220000
10	.790000	.900000E-01	.130000	.150000
11	-.930000	.220000	-.570000	.120000
12	-.720000	.120000	-.630000	.140000
13	-.790000	-.310000	.350000	-.600000E-01
14	-.720000	.300000	.380000	.190000
15	-.450000	-.250000	-.100000	-.240000
16	-.930000	-.430000	-.320000	.700000E-01
17	-.990000	.180000	-.960000	.210000
18	-.960000	.600000E-01	-.790000	.400000E-02
19	-.990000	.360000	-.930000	.330000
20	-.720000	.200000	-.650000	.400000E-01
21	-.610000	-.100000	-.270000	-.300000E-01

ENTRY	TG78 17	TU78 18	TG84 19	TU84 20
1	.700000E-01	-.520000	-.400000E-01	-.550000
2	.520000	.290000	.200000	.100000
3	.920000	.640000	.660000	.610000
4	.170000	.900000E-01	.110000	-.300000
5	.790000	-.270000	.750000	-.490000
6	-.620000	-.500000	-.600000	-.460000
7	-.150000	-.650000	-.560000	-.770000
8	-.880000	-.560000	-.780000	-.630000
9	-.590000	.290000	-.240000	.130000
10	.120000	-.400000E-01	-.470000	-.150000
11	-.510000	.700000E-01	-.490000	-.160000
12	-.570000	.150000	-.510000	.500000E-01
13	.190000	-.900000E-01	.360000	-.260000
14	.430000	.220000	.490000	.200000E-01
15	-.100000	-.120000	.600000E-01	-.110000
16	-.290000	.400000E-01	-.160000	-.150000
17	-.950000	.200000	-.910000	-.400000E-01
18	-.680000	.300000E-01	-.700000	-.170000
19	-.960000	.400000E-01	-.910000	-.150000
20	-.700000	.500000E-02	-.620000	-.280000
21	-.230000	-.200000E-01	-.150000	-.170000

ENTRY	IG63 21	IU63 22	IG68 23	IU68 24
1	19.0000	27.3000	25.5000	24.1000
2	1.50000	5.50000	3.90000	10.1000
3	2.30000	.200000	.500000	1.50000
4	21.5000	15.2000	25.3000	19.3000
5	5.80000	10.2000	6.10000	16.5000
6	33.9000	12.7000	40.1000	3.10000
7	1.20000	30.4000	3.60000	48.3000
8	39.6000	26.9000	43.2000	27.9000
9	3.20000	3.00000	6.10000	3.90000
10	3.20000	20.7000	4.20000	25.8000
11	26.9000	6.80000	28.6000	6.70000
12	55.8000	14.5000	56.9000	16.2000
13	33.9000	25.0000	36.6000	25.8000
14	11.7000	4.40000	13.5000	4.90000
15	61.9000	14.1000	61.7000	18.7000
16	23.6000	4.30000	39.2000	23.9000
17	73.8000	14.1000	78.7000	23.0000
18	50.9000	6.20000	52.6000	13.8000
19	54.4000	3.20000	71.2000	14.8000
20	64.4000	17.3000	70.3000	5.90000
21	32.0000	13.5000	39.2000	18.4000

ENTRY	IG74 25	IU74 26	IG78 27	IU78 28
1	13.5000	20.7000	14.3000	19.3000
2	2.70000	7.50000	2.20000	7.10000
3	1.60000	3.40000	3.20000	3.60000
4	13.5000	22.7000	11.9000	31.0000
5	4.80000	18.7000	5.90000	27.0000
6	16.4000	2.40000	16.0000	3.10000
7	1.70000	47.2000	2.70000	44.3000
8	34.7000	28.8000	32.0000	29.1000
9	3.10000	3.60000	4.70000	4.30000
10	35.6000	25.1000	47.8000	33.7000
11	11.2000	9.90000	12.7000	13.7000
12	41.4000	20.4000	41.1000	25.0000
13	13.9000	14.3000	21.3000	17.9000
14	7.10000	7.80000	9.10000	8.60000
15	43.4000	20.9000	34.0000	22.1000
16	18.2000	26.9000	14.5000	18.2000
17	71.2000	26.8000	66.1000	34.5000
18	37.2000	24.6000	37.5000	34.8000
19	51.9000	18.2000	62.4000	39.7000
20	49.3000	9.40000	56.0000	9.30000
21	26.3000	19.7000	25.1000	23.7000

ENTRY	IG84 29	IU84 30
1	24.8000	20.5000
2	4.40000	19.4000
3	12.7000	7.80000
4	18.9000	45.6000
5	12.5000	42.6000
6	17.4000	3.60000
7	4.40000	49.7000
8	34.1000	37.5000
9	3.20000	6.20000
10	52.7000	57.5000
11	11.6000	26.5000
12	42.3000	32.5000
13	11.3000	28.1000
14	8.90000	12.2000
15	27.9000	40.8000
16	12.4000	15.7000
17	77.1000	59.0000
18	35.8000	41.6000
19	36.7000	43.1000
20	65.1000	17.7000
21	25.9000	32.7000

```
cmoment(print,corr) 63,1 63,21
# EG63 EU63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     1      EG63
VAR     2      EU63

CORRELATION MATRIX
    VARIABLE              EG63          EU63
          SERIES LAG     1    0           2    0
    EG63         1    0   1.0000       -.16868
    EU63         2    0  -.16868        1.0000


cmoment(print,corr) 63,1 63,21
# EG68 EU68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     3      EG68
VAR     4      EU68

CORRELATION MATRIX
    VARIABLE              EG68          EU68
          SERIES LAG     3    0           4    0
    EG68         3    0   1.0000       -.28014E-01
    EU68         4    0  -.28014E-01    1.0000


cmoment(print,corr) 63,1 63,21
# EG74 EU74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     5      EG74
VAR     6      EU74

CORRELATION MATRIX
    VARIABLE              EG74          EU74
          SERIES LAG     5    0           6    0
    EG74         5    0   1.0000        .20471E-01
    EU74         6    0   .20471E-01    1.0000


cmoment(print,corr) 63,1 63,21
# EG78 EU78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR     7      EG78
VAR     8      EU78

CORRELATION MATRIX
    VARIABLE              EG78          EU78
          SERIES LAG     7    0           8    0
    EG78         7    0   1.0000        .66104E-01
    EU78         8    0   .66104E-01    1.0000


cmoment(print,corr) 63,1 63,21
# EG84 EU84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
```

```
CORRELATION MATRIX
    VARIABLE                EG84            EU84
          SERIES LAG     9    0         10    0
    EG84        9    0    1.0000          .18869
    EU84       10    0    .18869          1.0000


cmoment(print,corr) 63,1 63,21
# TG63 TU63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   11      TG63
VAR   12      TU63

CORRELATION MATRIX
    VARIABLE                TG63            TU63
          SERIES LAG    11    0         12    0
    TG63       11    0    1.0000          .17623
    TU63       12    0    .17623          1.0000


cmoment(print,corr) 63,1 63,21
# TG68 TU68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   13      TG68
VAR   14      TU68

CORRELATION MATRIX
    VARIABLE                TG68            TU68
          SERIES LAG    13    0         14    0
    TG68       13    0    1.0000          .33956
    TU68       14    0    .33956          1.0000


cmoment(print,corr) 63,1 63,21
# TG74 TU74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   15      TG74
VAR   16      TU74

CORRELATION MATRIX
    VARIABLE                TG74            TU74
          SERIES LAG    15    0         16    0
    TG74       15    0    1.0000          .15278
    TU74       16    0    .15278          1.0000


cmoment(print,corr) 63,1 63,21
# TG78 TU78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   17      TG78
VAR   18      TU78

CORRELATION MATRIX
    VARIABLE                TG78            TU78
          SERIES LAG    17    0         18    0
    TG78       17    0    1.0000          .22477
    TU78       18    0    .22477          1.0000
```

```
cmoment(print,corr) 63,1 63,21
# TG84 TU84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   19     TG84
VAR   20     TU84

CORRELATION MATRIX
    VARIABLE              TG84           TU84
          SERIES LAG    19    0        20    0
    TG84       19   0   1.0000         .30135
    TU84       20   0   .30135         1.0000


cmoment(print,corr) 63,1 63,21
# IG63 IU63

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   21     IG63
VAR   22     IU63

CORRELATION MATRIX
    VARIABLE              IG63           IU63
          SERIES LAG    21    0        22    0
    IG63       21   0   1.0000         .77343E-01
    IU63       22   0   .77343E-01     1.0000


cmoment(print,corr) 63,1 63,21
# IG68 IU68

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   23     IG68
VAR   24     IU68

CORRELATION MATRIX
    VARIABLE              IG68           IU68
          SERIES LAG    23    0        24    0
    IG68       23   0   1.0000        -.92874E-02
    IU68       24   0  -.92874E-02     1.0000


cmoment(print,corr) 63,1 63,21
# IG74 IU74

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   25     IG74
VAR   26     IU74

CORRELATION MATRIX
    VARIABLE              IG74           IU74
          SERIES LAG    25    0        26    0
    IG74       25   0   1.0000         .25395
    IU74       26   0   .25395         1.0000


cmoment(print,corr) 63,1 63,21
# IG78 IU78

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
```

```
CORRELATION MATRIX
    VARIABLE               IG78          IU78
          SERIES LAG    27    0       28    0
    IG78        27    0  1.0000        .44632
    IU78        28    0  .44632        1.0000


cmoment(print,corr) 63,1 63,21
# IG84 IU84

VARIABLES IN CROSS-MOMENT MATRIX
FROM  1963:  1  UNTIL  1983:  1
VAR   29      IG84
VAR   30      IU84

CORRELATION MATRIX
    VARIABLE               IG84          IU84
          SERIES LAG    29    0       30    0
    IG84        29    0  1.0000        .48783
    IU84        30    0  .48783        1.0000


end


         NORMAL COMPLETION OF JOB
                   HALT AT     0
                        0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:imG
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 IM NP PR IIM D1 D2
ols IM 1963,1 1984,1
# constant NP
```

```
DEPENDENT VARIABLE     1      IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22     DEGREES OF FREEDOM     20
R**2               .89715132      RBAR**2           .89200888
SSR            .11933450E+10      SEE           7724.4580
DURBIN-WATSON  1.59999999
Q(  11)=    3.38142        SIGNIFICANCE LEVEL  .984665
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1      CONSTANT    0    0    16032.56        5910.857        2.712392
  2      NP          2    0    .1315312        .9958185E-02    13.20835
```

```
ols IM 1963,1 1984,1
# constant NP PR IIM
```

```
DEPENDENT VARIABLE     1      IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22     DEGREES OF FREEDOM     18
R**2               .93652541      RBAR**2           .92594631
SSR            .73649056E+09      SEE           6396.5727
DURBIN-WATSON  1.43432245
Q(  11)=    9.93770        SIGNIFICANCE LEVEL  .536000
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1      CONSTANT    0    0    73220.66        19624.09        3.731162
  2      NP          2    0    .1305755        .2737785E-01    4.769385
  3      PR          3    0   -422.3232        136.7790       -3.087633
  4      IIM         4    0    .7160788E-01    .1776590        .4030636
```

```
set logNP 1963,1 1984,1 = log(NP(t))
set logIM 1963,1 1984,1 = log(IM(t))
set logPR 1963,1 1984,1 = log(PR(t))
set logIIM 1963,1 1984,1 = log(IIM(t))
ols logIM 1963,1 1984,1
# constant logNP logPR logIIM
```

```
DEPENDENT VARIABLE     8      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22     DEGREES OF FREEDOM     18
R**2               .95478972      RBAR**2           .94725467
SSR            .83965852E-01      SEE           .68299118E-01
```

```
Q(  11)=    15.0582         SIGNIFICANCE LEVEL   .179846
NO.      LABEL    VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******   ***  ***   ***********     ***********     ***********
  1      CONSTANT   0    0   3.611686        .9777370        3.693924
  2      LOGNP      7    0    .7638623       .1562682        4.888148
  3      LOGPR      9    0  -.8229423        .2072171       -3.971401
  4      LOGIIM    10    0    .1586547       .1432011        1.107915


ols logIM 1963,1 1984,1
# constant logNP logPR logIIM D1 D2


DEPENDENT VARIABLE     8      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS           22      DEGREES OF FREEDOM     16
R**2              .97020817      RBAR**2            .96089823
SSR           .55330254E-01      SEE           .58805959E-01
DURBIN-WATSON  1.39964916
Q(  11)=    23.5247         SIGNIFICANCE LEVEL  .148927E-01
NO.      LABEL    VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******   ***  ***   ***********     ***********     ***********
  1      CONSTANT   0    0   1.691654        1.223506        1.382628
  2      LOGNP      7    0   1.124743        .1951639        5.763069
  3      LOGPR      9    0  -1.026551        .1920532       -5.345139
  4      LOGIIM    10    0    .3522614E-02   .1359946        .2590260E-01
  5      D1         5    0  -.9697786E-01    .5441443E-01   -1.782208
  6      D2         6    0  -.9839092E-01    .3987364E-01   -2.467568


end

          NORMAL COMPLETION OF JOB
                  HALT AT     0
                      0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:corra
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 IM NP LIM LNP EI ENP
ols IM 1963,1 1984,1
# constant LIM NP LNP


DEPENDENT VARIABLE     1      IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     18
R**2              .97733858      RBAR**2           .97356168
SSR          11677645.           SEE         805.45519
DURBIN-WATSON  1.87456183
Q(  11)=    8.45674        SIGNIFICANCE LEVEL  .671899
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1      CONSTANT    0    0   -6842.882       3921.572        -1.744934
  2      LIM         3    0    .8240211        .1777761        4.635164
  3      NP          2    0    .6233334        .1058010        5.891562
  4      LNP         4    0   -.4952003        .1311245       -3.776565


ols EI 1963,1 1984,1
# constant ENP


DEPENDENT VARIABLE     5      EI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     20
R**2              .76420075      RBAR**2           .75241079
SSR          12094995.           SEE         777.65658
DURBIN-WATSON  1.96269985
Q(  11)=    7.33717        SIGNIFICANCE LEVEL  .771158
NO.      LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***   ************    ************    ************
  1      CONSTANT    0    0   -6342.629       1219.294        -5.201884
  2      ENP         6    0    .6721692       .8348935E-01     8.050957


end


          NORMAL COMPLETION OF JOB
                  HALT AT     0
                      0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:neo
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 IM NP PR IIM D1 D2
ols IM 1963,1 1984,1
# constant NP


DEPENDENT VARIABLE      1       IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      20
R**2              .94883399      RBAR**2           .94627568
SSR           26366337.          SEE           1148.1798
DURBIN-WATSON    .57075426
Q(  11)=     18.2479        SIGNIFICANCE LEVEL  .760033E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0   -23334.03          2013.116        -11.59100
  2      NP          2    0     .5227720          .2714520E-01    19.25836


ols IM 1963,1 1984,1
# constant NP PR IIM


DEPENDENT VARIABLE      1       IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      18
R**2              .96085672      RBAR**2           .95433284
SSR           20170908.          SEE           1058.5868
DURBIN-WATSON    .92781302
Q(  11)=     16.7782        SIGNIFICANCE LEVEL  .114610
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    -9100.688        7938.955         -1.146333
  2      NP          2    0      .3361354        .9367202E-01     3.588429
  3      PR          3    0    -42.62650        51.77378          -.8233222
  4      IIM         4    0      .3208359        .2028467         1.581667


set logNP 1963,1 1984,1 = log(NP(t))
set logIM 1963,1 1984,1 = log(IM(t))
set logPR 1963,1 1984,1 = log(PR(t))
set logIIM 1963,1 1984,1 = log(IIM(t))
ols logIM 1963,1 1984,1
# constant logNP logPR logIIM


DEPENDENT VARIABLE      8       LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      18
R**2              .97267245      RBAR**2           .96811785
SSR           .71709354E-01      SEE           .63117771E-01
```

```
Q(  11)=   19.7445        SIGNIFICANCE LEVEL  .489705E-01
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT    0    0  -15.22960        4.271797        -3.565151
  2     LOGNP       7    0   2.074962        .4826862         4.298780
  3     LOGPR       9    0  -.9381047E-01    .3366208        -.2786829
  4     LOGIIM     10    0   .2113629        .1809122         1.168317


ols logIM 1963,1 1984,1
# constant logNP logPR logIIM D1 D2


DEPENDENT VARIABLE     8      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      16
R**2             .98241391       RBAR**2           .97691826
SSR          .46147079E-01       SEE           .53704678E-01
DURBIN-WATSON   1.60479301
Q(  11)=   24.7433        SIGNIFICANCE LEVEL  .993860E-02
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT    0    0  -19.48043        3.906424        -4.986768
  2     LOGNP       7    0   2.625875        .4549638         5.771613
  3     LOGPR       9    0  -.3482958        .3313460        -1.051154
  4     LOGIIM     10    0   .1454742        .1558029         .9337067
  5     D1          5    0  -.1469050        .5516999E-01   -2.662770
  6     D2          6    0   .2859683E-01   .3787486E-01    .7550346


end

          NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS          0 WARNINGS
```

```
open data b:ex0
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 EX NP WY PR LEX

ols EX 1963,1 1984,1
# constant NP
```

```
DEPENDENT VARIABLE     1      EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      20
R**2              .92994064       RBAR**2           .92643767
SSR          .94218315E+09        SEE          6863.6111
DURBIN-WATSON   .89804253
Q(  11)=    10.5246         SIGNIFICANCE LEVEL   .483906
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   -34207.01        5252.125        -6.512985
  2      NP          2    0    .1441698        .8848402E-02    16.29332
```

```
set logEX 1963,1 1984,1 = log(EX(t))
set logNP 1963,1 1984,1 = log(NP(t))
set logWY 1963,1 1984,1 = log(WY(t))
set logPR 1963,1 1984,1 = log(PR(t))
set logLEX 1963,1 1984,1 = log(LEX(t))
ols logEX 1963,1 1984,1
# constant logWY logPR logLEX
```

```
DEPENDENT VARIABLE     6      LOGEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      18
R**2              .98332027       RBAR**2           .98054031
SSR          .13170002            SEE          .85537524E-01
DURBIN-WATSON  1.58047315
Q(  11)=    8.25416         SIGNIFICANCE LEVEL   .690371
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0   -18.83599        4.762920        -3.954714
  2      LOGWY       8    0    1.725230        .4242070         4.066953
  3      LOGPR       9    0   -1.203986        .2981572        -4.038092
  4      LOGLEX     10    0    .3025298        .1702267         1.777217
```

```
ols EX 1963,1 1984,1
# constant WY PR LEX
```

```
DEPENDENT VARIABLE     1      EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      18
R**2              .97224078       RBAR**2           .96761425
SSR          .37331581E+09        SEE          4554.0934
DURBIN-WATSON  1.90222065
Q(  11)=    9.99195         SIGNIFICANCE LEVEL   .531112
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************    ************    ************
  1      CONSTANT    0    0    10226.71        3262.322         3.134794
  2      WY          3    0    .5888430E-03    .1390477E-03     4.234826
  3      PR          4    0   -394.0137        98.92902        -3.982792
  4      LEX         5    0    [illegible]     [illegible]      [illegible]
```

```
NORMAL COMPLETION OF JOB
          HALT AT     0
              0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:exG
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 EX NP LEX LNP SE SNP


ols EX 1963,1 1984,1
# constant LEX NP LNP



DEPENDENT VARIABLE      1      EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      18
R**2              .95839371      RBAR**2            .95145933
SSR           .55953620E+09      SEE           5575.4233
DURBIN-WATSON  2.52301445
Q(  11)=    7.61228         SIGNIFICANCE LEVEL  .747556
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0   -13171.60        7407.063        -1.778249
  2      LEX         3    0    .5832063        .1839500         3.170460
  3      NP          2    0    .3988005E-01    .7165769E-01     .5565355
  4      LNP         4    0    .2280025E-01    .7289516E-01     .3127815


ols SE 1963,1 1984,1
# constant SNP



DEPENDENT VARIABLE      5      SE
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .78619758      RBAR**2            .77550746
SSR           .64879459E+09      SEE           5695.5886
DURBIN-WATSON  2.11894738
Q(  11)=    8.22199         SIGNIFICANCE LEVEL  .693291
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0   -17781.87        4811.266        -3.695882
  2      SNP         6    0    .1573849        .1835222E-01     8.575798


end


          NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS         0 WARNINGS
```

```
open data b:exU
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 EX LEX NP LNP SX SNP WY PR


ols EX 1963,1 1984,1
# constant NP



DEPENDENT VARIABLE      1       EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     20
R**2             .92744276       RBAR**2           .92381490
SSR          20191346.           SEE          1004.7723
DURBIN-WATSON    .59478716
Q(  11)=    38.7319          SIGNIFICANCE LEVEL  .588258E-04
NO.      LABEL      VAR  LAG     COEFFICIENT     STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ***********     ***********      ***********
  1      CONSTANT     0    0  -14353.48         1761.678        -8.147616
  2      NP           3    0    .3798122        .2375476E-01    15.98889


set logEX 1963,1 1984,1 = log(EX(t))
set logNP 1963,1 1984,1 = log(NP(t))
set logWY 1963,1 1984,1 = log(WY(t))
set logPR 1963,1 1984,1 = log(PR(t))
set logLEX 1963,1 1984,1 = log(LEX(t))
ols logEX 1963,1 1984,1
# constant logWY logPR logLEX



DEPENDENT VARIABLE      9       LOGEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     18
R**2             .98833512       RBAR**2           .98639097
SSR          .20970388E-01       SEE          .34132412E-01
DURBIN-WATSON  1.54924368
Q(  11)=    18.9967          SIGNIFICANCE LEVEL  .611528E-01
NO.      LABEL      VAR  LAG     COEFFICIENT     STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ***********     ***********      ***********
  1      CONSTANT     0    0  -2.463751         .5946115        -4.143463
  2      LOGWY       11    0    .6196225        .1117418         5.545127
  3      LOGPR       12    0  -.1118715         .6864372E-01    -1.629742
  4      LOGLEX      13    0    .3927180        .9835375E-01     3.992914


ols EX 1963,1 1984,1
# constant WY PR LEX



DEPENDENT VARIABLE      1       EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM     18
R**2             .98627241       RBAR**2           .98398448
SSR          3820136.3           SEE          460.68405
DURBIN-WATSON  1.50090223
Q(  11)=    22.3154          SIGNIFICANCE LEVEL  .220406E-01
NO.      LABEL      VAR  LAG     COEFFICIENT     STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ***********     ***********      ***********
  1      CONSTANT     0    0   1263.379         666.0166         1.896918
  2      WY           7    0   .5452382E-02     .9684251E-03     5.630154
```

```
end

          NORMAL COMPLETION OF JOB
                   HALT AT     0
                      0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -      60
OPE -      10
DAT -     200
MAT -      30
GLO -     500
LOC -       0
CON -     200
COM -     300
SER -     100
open data b:exU
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 EX LEX NP LNP SX SNP WY PR
ols EX 1963,1 1984,1
# constant NP
```

```
DEPENDENT VARIABLE      1       EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .92744276      RBAR**2           .92381490
SSR          20191346.          SEE          1004.7723
DURBIN-WATSON    .59478716
Q(  11)=     38.7319        SIGNIFICANCE LEVEL   .588258E-04
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0   -14353.48         1761.678        -8.147616
  2      NP          3    0    .3798122         .2375476E-01    15.98889
```

```
ols EX 1963,1 1984,1
# constant LEX NP LNP
```

```
DEPENDENT VARIABLE      1       EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      18
R**2              .97097269      RBAR**2           .96613480
SSR          8077767.4          SEE          669.89914
DURBIN-WATSON   1.42259238
Q(  11)=     14.7023        SIGNIFICANCE LEVEL   .196537
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1      CONSTANT    0    0   -3448.519         2437.284        -1.414902
  2      LEX         2    0    .7317543         .1486492         4.922694
  3      NP          3    0    .1996832         .8828107E-01     2.261903
  4      LNP         4    0   -.1007872         .9735334E-01    -1.035272
```

```
ols SX 1963,1 1984,1
# constant SNP
```

```
DEPENDENT VARIABLE      5       SX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      20
R**2              .61901851      RBAR**2           .59996944
SSR          9704436.0          SEE          696.57864
DURBIN-WATSON   1.63308622
Q(  11)=     9.56981        SIGNIFICANCE LEVEL   .569447
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
```

```
end

          NORMAL COMPLETION OF JOB
                    HALT AT      0
                        0 ERRORS          0 WARNINGS
```

```
BMA LOCAL 0 CONSTANTS 200 GLOBAL 500
EXP -     60
OPE -     10
DAT -    200
MAT -     30
GLO -    500
LOC -      0
CON -    200
COM -    300
SER -    100
open data b:imG
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 IM NP PR IIM D1 D2 MI PN RP IMM

ols IM 1963,1 1984,1
# constant NP PR IIM


DEPENDENT VARIABLE     1      IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      18
R**2             .93652541      RBAR**2           .92594631
SSR         .73649056E+09      SEE           6396.5727
DURBIN-WATSON  1.43432245
Q(  11)=    9.93770        SIGNIFICANCE LEVEL  .536000
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************    ************    ************
  1      CONSTANT    0    0    73220.66        19624.09         3.731162
  2      NP          2    0    .1305755        .2737785E-01     4.769385
  3      PR          3    0   -422.3232        136.7790        -3.087633
  4      IIM         4    0    .7160788E-01    .1776590         .4030636


ols MI 1963,1 1984,1
# constant PN RP IMM


DEPENDENT VARIABLE     7      MI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      18
R**2             .96085672      RBAR**2           .95433284
SSR          20170908.      SEE          1058.5868
DURBIN-WATSON   .92781302
Q(  11)=    16.7782        SIGNIFICANCE LEVEL  .114610
NO.      LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******     ***  ***    ************    ************    ************
  1      CONSTANT    0    0   -9100.688        7938.955        -1.146333
  2      PN          8    0    .3361354        .9367202E-01     3.588429
  3      RP          9    0   -42.62650        51.77378        -.8233222
  4      IMM        10    0    .3208359        .2028467         1.581667


ols IM 1963,1 1984,1
# constant NP PR IIM D1 D2


DEPENDENT VARIABLE     1      IM
FROM  1963:  1  UNTIL  1984:  1
```

```
SSR            .52289066E+09       SEE          5716.7007
DURBIN-WATSON   1.28869567
Q(  11)=     17.5176          SIGNIFICANCE LEVEL   .934694E-01
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***   ************    ************    ************
  1      CONSTANT     0    0    79680.44        17848.78         4.464196
  2      NP           2    0     .1814117       .3417114E-01     5.308914
  3      PR           3    0   -559.2474        134.0795        -4.171012
  4      IIM          4    0   -.3337163E-01    .1644528        -.2029253
  5      D1           5    0   -7464.723        5595.824        -1.333981
  6      D2           6    0   -10125.39        4138.200        -2.446811


ols MI 1963,1 1984,1
# constant PN RP IMM D1 D2


DEPENDENT VARIABLE     7     MI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22       DEGREES OF FREEDOM      16
R**2              .97730893       RBAR**2            .97021797
SSR            11692927.          SEE          854.87305
DURBIN-WATSON   1.46865978
Q(  11)=     34.7596          SIGNIFICANCE LEVEL   .271469E-03
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***   ************    ************    ************
  1      CONSTANT     0    0   -12724.02        6528.097        -1.949117
  2      PN           8    0     .4726629       .8690162E-01     5.439057
  3      RP           9    0   -71.42092        45.25116        -1.578322
  4      IMM         10    0     .1860031       .1724006         1.078900
  5      D1           5    0   -2268.311        900.3970        -2.519235
  6      D2           6    0    1039.319        632.8235         1.642353


set logNP 1963,1 1984,1 = log(NP(t))
set logPN 1963,1 1984,1 = log(PN(t))
set logIM 1963,1 1984,1 = log(IM(t))
set logMI 1963,1 1984,1 = log(MI(t))
set logPR 1963,1 1984,1 = log(PR(t))
set logRP 1963,1 1984,1 = log(RP(t))
set logIIM 1963,1 1984,1 = log(IIM(t))
set logIMM 1963,1 1984,1 = log(IMM(t))
ols(define=1) logIM 1963,1 1984,1
# constant logNP logPR logIIM


EQUATION     1
DEPENDENT VARIABLE    13      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22       DEGREES OF FREEDOM      18
R**2              .95478972       RBAR**2            .94725467
SSR            .83965852E-01      SEE          .68299118E-01
DURBIN-WATSON   1.49891413
Q(  11)=     15.0582          SIGNIFICANCE LEVEL   .179846
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***   ************    ************    ************
  1      CONSTANT     0    0    3.611686        .9777370         3.693924
  2      LOGNP       11    0     .7638623       .1562682         4.888148
  3      LOGPR       15    0   -.8229423        .2072171        -3.971401
  4      LOGIIM      17    0     .1586547       .1432011         1.107915


ols(define=3) logIM 1963,1 1984,1
# constant logNP logPR logIIM D1 D2
```

```
EQUATION     3
DEPENDENT VARIABLE    13      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     16
R**2              .97020817      RBAR**2            .96089823
SSR            .55330254E-01      SEE           .58805959E-01
DURBIN-WATSON  1.39964916
Q(   11)=    23.5247          SIGNIFICANCE LEVEL  .148927E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0    1.691654        1.223506        1.382628
  2     LOGNP      11    0    1.124743        .1951639        5.763069
  3     LOGPR      15    0   -1.026551        .1920532       -5.345139
  4     LOGIIM     17    0    .3522614E-02    .1359946        .2590260E-01
  5     D1          5    0   -.9697786E-01    .5441443E-01   -1.782208
  6     D2          6    0   -.9839092E-01    .3987364E-01   -2.467568
```

```
ols(define=2) logMI 1963,1 1984,1
# constant logPN logRP logIMM
```

```
EQUATION     2
DEPENDENT VARIABLE    14      LOGMI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     18
R**2              .97267245      RBAR**2            .96811785
SSR            .71709354E-01      SEE           .63117771E-01
DURBIN-WATSON  1.19593842
Q(   11)=    19.7445          SIGNIFICANCE LEVEL  .489705E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0   -15.22960        4.271797       -3.565151
  2     LOGPN      12    0    2.074962        .4826862        4.298780
  3     LOGRP      16    0   -.9381047E-01    .3366208       -.2786829
  4     LOGIMM     18    0    .2113629        .1809122        1.168317
```

```
ols(define=4) logMI 1963,1 1984,1
# constant logPN logRP logIMM D1 D2
```

```
EQUATION     4
DEPENDENT VARIABLE    14      LOGMI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM     16
R**2              .98241391      RBAR**2            .97691826
SSR            .46147079E-01      SEE           .53704678E-01
DURBIN-WATSON  1.60479301
Q(   11)=    24.7433          SIGNIFICANCE LEVEL  .993860E-02
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1     CONSTANT    0    0   -19.48043        3.906424       -4.986768
  2     LOGPN      12    0    2.625875        .4549638        5.771613
  3     LOGRP      16    0   -.3482958        .3313460       -1.051154
  4     LOGIMM     18    0    .1454742        .1558029        .9337067
  5     D1          5    0   -.1469050        .5516999E-01   -2.662770
  6     D2          6    0    .2859683E-01    .3787486E-01    .7550346
```

```
ols(define=5) IM 1963,1 1984,1
# constant NP PR IIM
```

```
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      18
R**2             .93652541       RBAR**2            .92594631
SSR         .73649056E+09        SEE           6396.5727
DURBIN-WATSON  1.43432245
Q(  11)=    9.93770         SIGNIFICANCE LEVEL  .536000
```

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	73220.66	19624.09	3.731162
2	NP	2	0	.1305755	.2737785E-01	4.769385
3	PR	3	0	-422.3232	136.7790	-3.087633
4	IIM	4	0	.7160788E-01	.1776590	.4030636

```
ols(define=6) MI 1963,1 1984,1
# constant PN RP IMM
```

```
EQUATION     6
DEPENDENT VARIABLE     7      MI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      18
R**2             .96085672       RBAR**2            .95433284
SSR          20170908.           SEE           1058.5868
DURBIN-WATSON   .92781302
Q(  11)=    16.7782         SIGNIFICANCE LEVEL  .114610
```

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	-9100.688	7938.955	-1.146333
2	PN	8	0	.3361354	.9367202E-01	3.588429
3	RP	9	0	-42.62650	51.77378	-.8233222
4	IMM	10	0	.3208359	.2028467	1.581667

```
ols(define=7) IM 1963,1 1984,1
# constant NP PR IIM D1 D2
```

```
EQUATION     7
DEPENDENT VARIABLE     1      IM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM      16
R**2             .95493456       RBAR**2            .94085161
SSR         .52289066E+09        SEE           5716.7007
DURBIN-WATSON  1.28869567
Q(  11)=    17.5176         SIGNIFICANCE LEVEL  .934694E-01
```

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	79680.44	17848.78	4.464196
2	NP	2	0	.1814117	.3417114E-01	5.308914
3	PR	3	0	-559.2474	134.0795	-4.171012
4	IIM	4	0	-.3337163E-01	.1644528	-.2029253
5	D1	5	0	-7464.723	5595.824	-1.333981
6	D2	6	0	-10125.39	4138.200	-2.446811

```
ols(define=8) MI 1963,1 1984,1
# constant PN RP IMM D1 D2
```

```
EQUATION     8
DEPENDENT VARIABLE     7      MI
FROM  1963:  1  UNTIL  1984:  1
```

```
SSR            11692927.              SEE              854.87305
DURBIN-WATSON   1.46865978
Q(   11)=     34.7596          SIGNIFICANCE LEVEL   .271469E-03
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***   ************    ************    ************
  1       CONSTANT     0    0   -12724.02        6528.097        -1.949117
  2       PN           8    0    .4726629        .8690162E-01     5.439057
  3       RP           9    0   -71.42092        45.25116        -1.578322
  4       IMM         10    0    .1860031        .1724006         1.078900
  5       D1           5    0   -2268.311        900.3970        -2.519235
  6       D2           6    0    1039.319        632.8235         1.642353


SUR 2 63,1 84,1
# 1
# 2


EQUATION     1
DEPENDENT VARIABLE    13       LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22       DEGREES OF FREEDOM      18
R**2                 .95453701       RBAR**2              .94695984
SSR              .84435197E-01      SEE               .68489738E-01
DURBIN-WATSON   1.63491314
Q(   11)=     12.9748          SIGNIFICANCE LEVEL   .294974
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***   ************    ************    ************
  1       CONSTANT     0    0    3.424581        .8581570         3.990623
  2       LOGNP       11    0    .7274316        .1379825         5.271913
  3       LOGPR       15    0   -.7648456        .1787698        -4.278383
  4       LOGIIM      17    0    .1920084        .1263882         1.519196


EQUATION     2
DEPENDENT VARIABLE    14       LOGMI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22       DEGREES OF FREEDOM      18
R**2                 .97169595       RBAR**2              .96697860
SSR              .74271755E-01      SEE               .64235571E-01
DURBIN-WATSON   1.39742437
Q(   11)=     14.6309          SIGNIFICANCE LEVEL   .200027
NO.       LABEL      VAR  LAG    COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***   ************    ************    ************
  5       CONSTANT     0    0   -12.02476        3.702102        -3.248089
  6       LOGPN       12    0    1.705202        .4175256         4.084066
  7       LOGRP       16    0   -.1501895        .2973226        -.5051397
  8       LOGIMM      18    0    .3380974        .1569589         2.154051


          COVARIANCE/CORRELATION MATRIX
     VARIABLE              LOGIM          LOGMI
           SERIES LAG      13    0        14    0
     LOGIM      13    0    .38380E-02     .43188
     LOGMI      14    0    .15546E-02     .33760E-02


SUR 2 63,1 84,1 EQUATE 1 2
# 1
# 2
```

```
EQUATION     1
DEPENDENT VARIABLE    13      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22       DEGREES OF FREEDOM      18
R**2               .94936854       RBAR**2             .94092997
SSR           .94034219E-01        SEE           .72278097E-01
DURBIN-WATSON  1.83125077
Q(  11)=     5.70690         SIGNIFICANCE LEVEL  .892188
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    2.498338         .7949000         3.142959
  2      LOGNP      11    0     .6979504        .1347674         5.178927
  3      LOGPR      15    0   -.5219665         .1509169        -3.458634
  4      LOGIIM     17    0     .2009315        .1229303         1.634516


EQUATION     2
DEPENDENT VARIABLE    14      LOGMI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22       DEGREES OF FREEDOM      18
R**2               .94248639       RBAR**2             .93290079
SSR           .15091961            SEE           .91566495E-01
DURBIN-WATSON  1.26878158
Q(  11)=     10.1386         SIGNIFICANCE LEVEL  .517968
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    2.498338         .7949000         3.142959
  2      LOGPN      12    0     .6979504        .1347674         5.178927
  5      LOGRP      16    0   -1.212064         .1990647        -6.088790
  6      LOGIMM     18    0     .5310000        .7879150E-01     6.739306


        COVARIANCE/CORRELATION MATRIX
   VARIABLE                LOGIM           LOGMI
        SERIES LAG       13    0          14    0
   LOGIM      13    0    .42743E-02     .62511
   LOGMI      14    0    .33849E-02     .68600E-02


SUR 2 63,1 84,1
# 3
# 4


EQUATION     3
DEPENDENT VARIABLE    13      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22       DEGREES OF FREEDOM      16
R**2               .97002106       RBAR**2             .96065263
SSR           .55677773E-01        SEE           .58990345E-01
DURBIN-WATSON  1.47184826
Q(  11)=     21.6821         SIGNIFICANCE LEVEL  .269553E-01
NO.      LABEL     VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***     *******    ***  ***    ************    ************    ************
  1      CONSTANT    0    0    1.627882        1.037549          1.568968
  2      LOGNP      11    0    1.079453         .1642158         6.573382
  3      LOGPR      15    0   -.9766192         .1605939        -6.081296
  4      LOGIIM     17    0     .3970840E-01    .1144057          .3470840
  5      D1          5    0   -.9367363E-01     .4622974E-01    -2.026263
  6      D2          6    0   -.9502845E-01     .3392748E-01    -2.800929
```

```
EQUATION     4
DEPENDENT VARIABLE    14      LOGMI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      16
R**2               .98215571      RBAR**2            .97657937
SSR           .46824622E-01      SEE           .54097494E-01
DURBIN-WATSON  1.73979328
Q(  11)=    23.6894          SIGNIFICANCE LEVEL  .141080E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  7     CONSTANT    0    0   -17.82438        3.281196       -5.432282
  8     LOGPN      12    0    2.411274        .3815745        6.319275
  9     LOGRP      16    0   -.3350466        .2791573       -1.200207
 10     LOGIMM     18    0    .2170268        .1304963        1.663088
 11     D1          5    0   -.1405876        .4690087E-01   -2.997547
 12     D2          6    0    .2718717E-01   .3222679E-01    .8436202


        COVARIANCE/CORRELATION MATRIX
    VARIABLE              LOGIM          LOGMI
         SERIES LAG    13    0         14    0
    LOGIM      13    0    .25308E-02    .30327
    LOGMI      14    0    .70385E-03    .21284E-02


SUR 2 63,1 84,1 EQUATE 3 4
# 3
# 4


EQUATION     3
DEPENDENT VARIABLE    13      LOGIM
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      16
R**2               .96772161      RBAR**2            .95763462
SSR           .59948364E-01      SEE           .61210887E-01
DURBIN-WATSON  1.68058704
Q(  11)=    14.9647          SIGNIFICANCE LEVEL  .184117
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  3     CONSTANT    0    0    1.412818        1.007241        1.402662
  4     LOGNP      11    0    .9756487        .1409896        6.920003
  1     LOGPR      15    0   -.8124159        .1405941       -5.778448
  2     LOGIIM     17    0    .1064304        .9347193E-01    1.138635
  5     D1          5    0   -.8032047E-01   .4596112E-01   -1.747574
  6     D2          6    0   -.8423991E-01   .3403661E-01   -2.474980


EQUATION     4
DEPENDENT VARIABLE    14      LOGMI
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS               22      DEGREES OF FREEDOM      16
R**2               .98021867      RBAR**2            .97403700
SSR           .51907560E-01      SEE           .56958076E-01
DURBIN-WATSON  1.53807736
Q(  11)=    20.3665          SIGNIFICANCE LEVEL  .405604E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ************   ************   ************
  7     CONSTANT    0    0   -17.38735        2.650435       -6.560187
  8     LOGPN      12    0    2.671909        .3051043        8.757364
[illegible]
```

10	D2	6	0	.1069038E-01	.3244061E-01	.3295370

COVARIANCE/CORRELATION MATRIX

VARIABLE			LOGIM	LOGMI
	SERIES	LAG	13 0	14 0
LOGIM	13	0	.27249E-02	.27896
LOGMI	14	0	.70734E-03	.23594E-02

```
SUR 2 63,1 84,1
# 5
# 6
```

EQUATION 5
DEPENDENT VARIABLE 1 IM
FROM 1963: 1 UNTIL 1984: 1
OBSERVATIONS 22 DEGREES OF FREEDOM 18
R**2 .93632292 RBAR**2 .92571008
SSR .73884002E+09 SEE 6406.7673
DURBIN-WATSON 1.53638626
Q(11)= 8.80395 SIGNIFICANCE LEVEL .639983

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	69412.90	16531.12	4.198924
2	NP	2	0	.1256691	.2385662E-01	5.267684
3	PR	3	0	-397.9500	114.7878	-3.466833
4	IIM	4	0	.1057846	.1549359	.6827635

EQUATION 6
DEPENDENT VARIABLE 7 MI
FROM 1963: 1 UNTIL 1984: 1
OBSERVATIONS 22 DEGREES OF FREEDOM 18
R**2 .95893756 RBAR**2 .95209382
SSR 21159868. SEE 1084.2270
DURBIN-WATSON 1.17254798
Q(11)= 14.2445 SIGNIFICANCE LEVEL .219761

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
5	CONSTANT	0	0	-3988.934	6848.336	-.5824675
6	PN	8	0	.2541007	.7912176E-01	3.211515
7	RP	9	0	-52.50837	45.36109	-1.157564
8	IMM	10	0	.4678122	.1729290	2.705227

COVARIANCE/CORRELATION MATRIX

VARIABLE			IM	MI
	SERIES	LAG	1 0	7 0
IM	1	0	.33584E+08	.50122
MI	7	0	.28486E+07	.96181E+06

```
SUR 2 63,1 84,1
# 7
# 8
```

EQUATION 7
DEPENDENT VARIABLE 1 IM
FROM 1963: 1 UNTIL 1984: 1
OBSERVATIONS 22 DEGREES OF FREEDOM 16
R**2 .95448050 RBAR**2 .94025566
SSR .52815911E+09 SEE 5745.4281
DURBIN-WATSON 1.38897449
Q(11)= 15.1341 SIGNIFICANCE LEVEL .176441

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
1	CONSTANT	0	0	73404.96	13146.61	5.583565
2	NP	2	0	.1763410	.2608636E-01	6.759894
3	PR	3	0	-521.0023	95.82155	-5.437214
4	IIM	4	0	.9172837E-02	.1265499	.7248395E-01
5	D1	5	0	-7935.325	4612.285	-1.720476
6	D2	6	0	-9992.699	3439.081	-2.905631

EQUATION 8
DEPENDENT VARIABLE 7 MI
FROM 1963: 1 UNTIL 1984: 1
OBSERVATIONS 22 DEGREES OF FREEDOM 16
R**2 .97569872 RBAR**2 .96810457
SSR 12522683. SEE 884.68506
DURBIN-WATSON 1.65659099
Q(11)= 28.7326 SIGNIFICANCE LEVEL .249714E-02

NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	************	************	************
7	CONSTANT	0	0	-8177.483	4982.916	-1.641104
8	PN	8	0	.3862769	.6511114E-01	5.932577
9	RP	9	0	-74.79572	35.24199	-2.122347
10	IMM	10	0	.3344614	.1273378	2.626569
11	D1	5	0	-2059.270	747.8350	-2.753643
12	D2	6	0	885.3153	525.5200	1.684646

COVARIANCE/CORRELATION MATRIX

VARIABLE			IM	MI
	SERIES	LAG	1 0	7 0
IM	1	0	.24007E+08	.67791
MI	7	0	.25060E+07	.56921E+06

end

NORMAL COMPLETION OF JOB
HALT AT 0
0 ERRORS 0 WARNINGS

```
open data c:ex0
cal 1963 1 1
all 0 1984,1
data 1963,1 1984,1 EX NP WY PR LEX D1 UEX ULEX UNP UWY UPR D2


set logEX 1963,1 1984,1 = log(EX(t))
set logUEX 1963,1 1984,1 = log(UEX(t))
set logNP 1963,1 1984,1 = log(NP(t))
set logUNP 1963,1 1984,1 = log(UNP(t))
set logWY 1963,1 1984,1 = log(WY(t))
set logUWY 1963,1 1984,1 = log(UWY(t))
set logPR 1963,1 1984,1 = log(PR(t))
set logUPR 1963,1 1984,1 = log(UPR(t))
set logLEX 1963,1 1984,1 = log(LEX(t))
set logULEX 1963,1 1984,1 = log(ULEX(t))
ols(define=1) logEX 1963,1 1984,1
# constant logWY logPR logLEX
```

```
EQUATION     1
DEPENDENT VARIABLE    13      LOGEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      18
R**2              .98332027      RBAR**2           .98054031
SSR          .13170002           SEE            .85537524E-01
DURBIN-WATSON  1.58047315
Q(  11)=    8.25416        SIGNIFICANCE LEVEL  .690371
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ***********    ***********     ***********
  1     CONSTANT    0    0   -18.83599       4.762920        -3.954714
  2     LOGWY      17    0    1.725230        .4242070        4.066953
  3     LOGPR      19    0   -1.203986        .2981572       -4.038092
  4     LOGLEX     21    0    .3025298        .1702267        1.777217
```

```
ols(define=3) logEX 1963,1 1984,1
# constant logWY logPR logLEX D1
```

```
EQUATION     3
DEPENDENT VARIABLE    13      LOGEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      17
R**2              .98549754      RBAR**2           .98208519
SSR          .11450872           SEE            .82071964E-01
DURBIN-WATSON  1.34186494
Q(  11)=    11.5910        SIGNIFICANCE LEVEL  .395157
NO.      LABEL     VAR  LAG    COEFFICIENT    STAND. ERROR    T-STATISTIC
***     *******    ***  ***   ***********    ***********     ***********
  1     CONSTANT    0    0   -20.75044       4.724456        -4.392132
  2     LOGWY      17    0    1.809528        .4104263        4.408899
  3     LOGPR      19    0   -1.056095        .3006824       -3.512326
  4     LOGLEX     21    0    .2708430        .1645299        1.646163
  5     D1          6    0   -.1729431        .1082539       -1.597569
```

```
ols(define=5) EX 1963,1 1984,1
# constant WY PR LEX D1
```

```
    7       67641.0      .121978E+07     122.000       .000000
    8       69036.0      .125667E+07     127.000       .000000
    9       70585.0      .129006E+07     127.000       .000000
   10       71762.0      .136308E+07     120.000       .000000
   11       78039.0      .153033E+07     110.000       [illegible]
```

```
EQUATION     5
DEPENDENT VARIABLE     1       EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                 22      DEGREES OF FREEDOM      17
R**2                .98644473      RBAR**2              .98325526
SSR           .18229603E+09      SEE              3274.6444
DURBIN-WATSON  1.44542117
Q(  11)=    18.5456          SIGNIFICANCE LEVEL  .697547E-01
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************   ************    ************
  1      CONSTANT     0    0    602.3660        3271.482         .1841263
  2      WY           3    0    .7277028E-03    .1052570E-03    6.913581
  3      PR           4    0  -390.3792         71.14063        -5.487429
  4      LEX          5    0    .1740905        .1273869         1.366629
  5      D1           6    0  -16635.28         3941.442        -4.220608
```

```
ols(define=6) UEX 1963,1 1984,1
# constant UWY UPR ULEX D2
```

```
EQUATION     6
DEPENDENT VARIABLE     7       UEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                 22      DEGREES OF FREEDOM      17
R**2                .98673435      RBAR**2              .98361302
SSR            3691586.9          SEE              465.99589
DURBIN-WATSON  1.42503215
Q(  11)=    21.3527          SIGNIFICANCE LEVEL  .298956E-01
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************   ************    ************
  1      CONSTANT     0    0    1580.104        789.5086         2.001377
  2      UWY         10    0    .5242834E-02    .1016747E-02    5.156477
  3      UPR         11    0   -7.710142        7.086241        -1.088044
  4      ULEX         8    0    .3853615        .1040760         3.702671
  5      D2          12    0    387.7852        504.0092         .7694011
```

```
ols(define=2) logUEX 1963,1 1984,1
# constant logUWY logUPR logULEX
```

```
EQUATION     2
DEPENDENT VARIABLE    14       LOGUEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS                 22      DEGREES OF FREEDOM      18
R**2                .98833512      RBAR**2              .98639097
SSR            .20970388E-01      SEE              .34132412E-01
DURBIN-WATSON  1.54924368
Q(  11)=    18.9967          SIGNIFICANCE LEVEL  .611528E-01
NO.       LABEL      VAR  LAG     COEFFICIENT    STAND. ERROR     T-STATISTIC
***      *******     ***  ***    ************   ************    ************
  1      CONSTANT     0    0   -2.463751        .5946115        -4.143463
  2      LOGUWY      18    0    .6196225        .1117418         5.545127
  3      LOGUPR      20    0   -.1118715        .6864372E-01   -1.629742
  4      LOGULEX     22    0    .3927180        .9835375E-01    3.992914
```

```
ols(define=4) logUEX 1963,1 1984,1
# constant logUWY logUPR logULEX D2
```

```
EQUATION     4
DEPENDENT VARIABLE    14       LOGUEX
```

```
SSR            .20968113E-01      SEE           .35120057E-01
DURBIN-WATSON  1.55583040
Q(  11)=    19.1203        SIGNIFICANCE LEVEL  .589687E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******   ***  ***   ***********   ***********     ***********
  1      CONSTANT   0    0   -2.488633       .8426523        -2.953333
  2      LOGUWY    18    0    .6207045       .1177036         5.273456
  3      LOGUPR    20    0   -.1126799       .7309537E-01   -1.541546
  4      LOGULEX   22    0    .3942330       .1071730         3.678472
  5      D2        12    0   -.1545847E-02   .3599832E-01   -.4294220E-01


SUR 2 63,1 84,1
# 1
# 2


EQUATION     1
DEPENDENT VARIABLE    13      LOGEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM     18
R**2             .98331869       RBAR**2          .98053847
SSR           .13171250          SEE          .85541577E-01
DURBIN-WATSON  1.56870636
Q(  11)=    8.34165          SIGNIFICANCE LEVEL  .682412
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******   ***  ***   ***********   ***********     ***********
  1      CONSTANT   0    0   -19.01992       4.306861        -4.416191
  2      LOGWY     17    0    1.741929       .3835858         4.541172
  3      LOGPR     19    0   -1.216217       .2696109        -4.511007
  4      LOGLEX    21    0    .2961197       .1539262         1.923777


EQUATION     2
DEPENDENT VARIABLE    14      LOGUEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS             22      DEGREES OF FREEDOM     18
R**2             .98833421       RBAR**2          .98638992
SSR           .20972012E-01      SEE          .34133734E-01
DURBIN-WATSON  1.55490906
Q(  11)=    18.9310          SIGNIFICANCE LEVEL  .623436E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR    T-STATISTIC
***      *******   ***  ***   ***********   ***********     ***********
  5      CONSTANT   0    0   -2.443842       .5376989        -4.545001
  6      LOGUWY    18    0    .6154896       .1010443         6.091285
  7      LOGUPR    20    0   -.1103969       .6208458E-01   -1.778170
  8      LOGULEX   22    0    .3960552       .8893744E-01    4.453189


         COVARIANCE/CORRELATION MATRIX
     VARIABLE              LOGEX          LOGUEX
          SERIES LAG      13    0        14    0
     LOGEX      13    0   .59869E-02    .35826E-01
     LOGUEX     14    0   .85586E-04    .95327E-03


SUR 2 63,1 84,1 EQUATE 1 2
# 1
# 2
```

```
EQUATION      1
DEPENDENT VARIABLE     13       LOGEX
FROM  1963:   1  UNTIL  1984:   1
OBSERVATIONS                 22      DEGREES OF FREEDOM        18
R**2                .96776647        RBAR**2            .96239422
SSR             .25450987            SEE            .11890937
DURBIN-WATSON   2.13414362
Q(   11)=      3.33286          SIGNIFICANCE LEVEL   .985556
NO.        LABEL      VAR   LAG     COEFFICIENT     STAND. ERROR     T-STATISTIC
***       *******     ***   ***    ************     ************     ************
  1       CONSTANT     0     0   -1.114515          .6868450        -1.622659
  2       LOGWY       17     0     .2035208         .8164614E-01     2.492718
  3       LOGPR       19     0   -.2399017          .1167232        -2.055305
  4       LOGLEX      21     0     .8644398         .6374378E-01    13.56116



EQUATION      2
DEPENDENT VARIABLE     14       LOGUEX
FROM  1963:   1  UNTIL  1984:   1
OBSERVATIONS                 22      DEGREES OF FREEDOM        18
R**2                .97583797        RBAR**2            .97181096
SSR             .43436975E-01        SEE            .49123979E-01
DURBIN-WATSON   1.48096962
Q(   11)=      19.9629          SIGNIFICANCE LEVEL   .458521E-01
NO.        LABEL      VAR   LAG     COEFFICIENT     STAND. ERROR     T-STATISTIC
***       *******     ***   ***    ************     ************     ************
  1       CONSTANT     0     0   -1.114515          .6868450        -1.622659
  2       LOGUWY      18     0    .2035208          .8164614E-01     2.492718
  5       LOGUPR      20     0    .7398410E-01      .7813898E-01     .9468271
  6       LOGULEX     22     0    .7789250          .6872851E-01    11.33336



          COVARIANCE/CORRELATION MATRIX
     VARIABLE                  LOGEX           LOGUEX
           SERIES LAG      13    0          14    0
     LOGEX        13    0    .11569E-01    -.31141
     LOGUEX       14    0  -.14883E-02    .19744E-02


SUR 2 63,1 84,1
# 3
# 4


EQUATION      3
DEPENDENT VARIABLE     13       LOGEX
FROM  1963:   1  UNTIL  1984:   1
OBSERVATIONS                 22      DEGREES OF FREEDOM        17
R**2                .98549322        RBAR**2            .98207986
SSR             .11454283            SEE            .82084187E-01
DURBIN-WATSON   1.32212073
Q(   11)=      11.8510          SIGNIFICANCE LEVEL   .374950
NO.        LABEL      VAR   LAG     COEFFICIENT     STAND. ERROR     T-STATISTIC
***       *******     ***   ***    ************     ************     ************
  1       CONSTANT     0     0   -21.06310          4.149157        -5.076476
  2       LOGWY       17     0    1.837357          .3604545         5.097335
  3       LOGPR       19     0   -1.075172          .2640951        -4.071154
  4       LOGLEX      21     0    .2601651          .1444952         1.800511
  5       D1           6     0   -.1740343          .9503771E-01    -1.831213
```

```
EQUATION     4
DEPENDENT VARIABLE    14      LOGUEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      17
R**2               .98833326      RBAR**2           .98558815
SSR          .20973721E-01      SEE           .35124754E-01
DURBIN-WATSON  1.57019764
Q(  11)=   19.0888           SIGNIFICANCE LEVEL  .595175E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  6     CONSTANT    0    0   -2.478448       .7399625        -3.349424
  7     LOGUWY     18    0    .6149511       .1033779         5.948576
  8     LOGUPR     20    0   -.1106194       .6424448E-01    -1.721851
  9     LOGULEX    22    0    .4008014       .9412715E-01     4.258085
 10     D2         12    0   -.2754968E-02   .3160939E-01    -.8715662E-01


         COVARIANCE/CORRELATION MATRIX
    VARIABLE              LOGEX          LOGUEX
           SERIES LAG    13    0        14    0
    LOGEX       13    0    .52065E-02    .62591E-01
    LOGUEX      14    0    .13945E-03    .95335E-03


SUR 2 63,1 84,1
# 5
# 6


EQUATION     5
DEPENDENT VARIABLE     1      EX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      17
R**2               .98644472      RBAR**2           .98325524
SSR          .18229624E+09      SEE           3274.6463
DURBIN-WATSON  1.44421306
Q(  11)=    18.5697          SIGNIFICANCE LEVEL  .692678E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  1     CONSTANT     0    0    611.4442       2875.778         .2126187
  2     WY           3    0    .7281014E-03   .9252546E-04    7.869201
  3     PR           4    0   -390.6946       62.53573        -6.247541
  4     LEX          5    0    .1736516       .1119786         1.550757
  5     D1           6    0   -16633.32       3464.695        -4.800805


EQUATION     6
DEPENDENT VARIABLE     7      UEX
FROM  1963:  1  UNTIL  1984:  1
OBSERVATIONS              22      DEGREES OF FREEDOM      17
R**2               .98673426      RBAR**2           .98361291
SSR           3691611.5           SEE          465.99744
DURBIN-WATSON  1.42634449
Q(  11)=    21.3676          SIGNIFICANCE LEVEL  .297565E-01
NO.      LABEL     VAR  LAG    COEFFICIENT   STAND. ERROR     T-STATISTIC
***     *******    ***  ***   ************   ************    ************
  6     CONSTANT     0    0    1573.952       694.0137         2.267897
  7     UWY         10    0    .5241928E-02   .8937653E-03     5.864994
  8     UPR         11    0   -7.699521       6.229148        -1.236047
  9     ULEX         8    0    .3860303       .9148738E-01     4.219492
 10     D2          12    0    382.9278       443.0458          .8643075
```

```
     COVARIANCE/CORRELATION MATRIX
VARIABLE               EX           UEX
      SERIES LAG       1    0        7    0
EX          1    0   .82862E+07   .60083E-02
UEX         7    0   7084.7       .16780E+06
```

end

```
          NORMAL COMPLETION OF JOB
                    HALT AT     0
                        0 ERRORS          0 WARNINGS
```